

**CUMULATIVE IMPACTS DOCUMENT
(CID)
UPDATE REPORT**

June 2000

FINAL



ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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EXECUTIVE SUMMARY

Background and Purpose

The 1997 Rocky Flats Cumulative Impacts Document (CID) examined environmental impacts associated with RFETS mission changes, and significant new circumstances and information relevant to environmental concerns. The primary objective of this document, the CID Update Report (Update), is to address a commitment made by the DOE Rocky Flats Field Office in its January 2000 Annual NEPA Planning Summary: "FY 2000 NEPA compliance activities with respect to evaluating the need for a site-wide EIS will include an examination of impacts presented in the CID relative to potential impacts of activities in the RFETS 2006 Closure Plan dated October 1999."

The Update addresses this commitment by developing an updated characterization of the cumulative environmental impacts of RFETS closure to help determine whether the environmental impacts of current and planned future activities at the Site are adequately addressed in the CID. It also provides an updated technical resource for environmental analysis and cumulative impacts which reflects current (accelerated) closure plans, and that can be referenced in other Site NEPA documents. It is important to note that the Update does not alter the NEPA status of the CID, nor does it provide new "ground-up" technical analyses of the impacts of RFETS closure activities.

Characterization of Closure Activity Changes

The approach for the Update was to identify changes in activities, identify and analyze changes by resource area, and develop a revised cumulative impact characterization, where applicable.

Current closure activities were found to be similar in nature to those analyzed in the CID Closure Case, with two exceptions: the addition or cancellation of certain activities; and the acceleration of previously planned activities as reflected in the 2006 Plan. Only the volume of low level radioactive waste (LLW) and low level radioactive mixed waste (LLMW) to be shipped off-site for disposal was identified as a significant change in activities previously analyzed in the CID.

Human health and safety was affected by the most activity changes, while air quality and traffic/transportation were affected by many activity changes. Socioeconomic impacts from Site closure were found to be more dramatic than those identified in the CID, because closure would occur over a shorter period of time. Generally, differences occurred because activities are now more concentrated in time than when analyzed in the CID, and due to some cases when closure activities substantially changed.

Environmental Impact Analysis

Several impacts were identified which differed in nature or magnitude from impacts presented in the CID. These impacts included increased fugitive dust emissions from

pavement removal; additional fugitive dust and noise impacts from concrete crushing; decreased vehicle-related risks from on-site TRU/TRM waste transportation; increased risk associated with development and maintenance of additional interim on-site storage of wastes (especially TRU/TRUM); lowered impacts from LLW/LLMW shipping; reduced overall impacts from closure cap material shipments; and cumulative impacts.

Some of the activities and impacts identified in the Update were not analyzed in the CID. In some cases (e.g., pavement removal), entirely new activities are represented; in others (e.g., LLW/LLMW packaging), the Update addresses a more complete spectrum of closure plan requirements. Accordingly, the Update analysis reflects the full spectrum of activities in the 2006 Plan, and provides an updated technical resource for closure activity impacts.

Conclusions

Overall, impacts from Site closure under the Update are not expected to be substantially different or greater than those impacts presented in the CID. In some cases, impacts are estimated to be less than the impacts presented in the CID. Accordingly, the original CID conclusions regarding a RFETS Site Wide Environmental Impact Statement (SWEIS) remain valid.

With regard to the need for a Supplement Analysis, given that no significant new or changed impacts were identified, the changed activities do not present appreciable changes in cumulative impacts from the activities analyzed in the CID. Results of the Update also support DOE's conclusion about the need for a new SWEIS, based on the CID's adequacy. Specifically, the Update confirms the overall conclusion that "...environmental impacts of cleanup activities will be localized in the Industrial Area and will not present appreciable changes in Site-wide environmental impacts from those associated with Site operations reviewed under the 1980 SWEIS."

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CID UPDATE REPORT

Final

June 15, 2000

1.0 INTRODUCTION

1.1 Background and Purpose

In 1980, the Department of Energy (DOE) published a site-wide Environmental Impact Statement (EIS) (DOE, 1980) which analyzed environmental impacts of continued operation of the Rocky Flats Plant. This EIS addressed the former Site mission of support to the nation's nuclear weapons program. In 1989, operations at the Plant were suspended, and in 1991, the Site mission was formally changed from weapons production to environmental restoration and site closure; the Site name was changed at that time to the Rocky Flats Environmental Technology Site (RFETS).

Current RFETS policy regarding National Environmental Policy Act (NEPA) compliance requirements for a site-wide EIS has been articulated in the Rocky Flats Field Office (RFFO) Annual NEPA Planning Summaries. In the January 1999 Planning Summary (DOE, 1999a), the following policy positions were communicated to DOE Headquarters.

Regarding the SWEIS:

"A draft Site Wide Environmental Impact Statement (SWEIS) was prepared in 1996 ... [it] ... was cancelled in early 1997 because data generated during the development of the draft SWEIS in relation to cleanup plans indicates that environmental impacts of cleanup activities will be localized in the Industrial Area and will not present appreciable changes in Site-wide environmental impacts from those associated with Site operations reviewed under the 1980 SWEIS."

Regarding previous compliance with Supplement Analysis (SA) requirements:

"Much of the data generated in development of the draft SWEIS is contained in the Rocky Flats Cumulative Impacts Document (CID) which was made available to the public in RFETS reading rooms in June 1997. Although not formally identified as such, publication of the CID did satisfy several of the requirements attendant to a [Supplemental Analysis] SA. Specifically, the CID analysis did examine environmental impacts associated with changes in the proposed action at RFETS and any significant new circumstances and information relevant to environmental concerns. DOE also made this analysis available to the public, as required for SAs. Public notification of the results of DOE's determination of whether a new site-wide EIS is required was effected through the announcement that the 1996 draft SWEIS was being deferred."

Regarding future compliance with SA requirements:

“Future, ongoing NEPA compliance activities with respect to evaluating the need for a site-wide EIS will include conduct of an analysis of the Cases addressed in the CID to cross-reference activities in the current RFETS Closure Plan to those considered in the CID. ... It will document whether the environmental impacts of current and planned future activities at the Site are adequately addressed in the CID.” [Note that wording in the 1999 NEPA Planning Summary was restricted to bringing the analysis up to date through FY 1998.]

In its January 2000 Annual NEPA Planning Summary (DOE, 2000), DOE/RFFO has stated:

“FY 2000 NEPA compliance activities with respect to evaluating the need for a site-wide EIS will include an examination of impacts presented in the CID relative to potential impacts of activities in the RFETS 2006 Closure Plan dated October 1999. This analysis will bring the SA up to date through FY 2000 and will be conducted as part of the annual NEPA Evaluation. It will document whether the environmental impacts of current and planned future activities at the Site are adequately addressed in the CID.” (DOE, 2000)

The primary objective of the CID Update is to address this commitment by developing an updated characterization of the cumulative environmental impacts of RFETS closure. It will also provide an updated technical resource for environmental analysis and cumulative impacts which reflects current (accelerated) closure plans and can be referenced in other Site NEPA documents.

It is important to note that the Update analysis will not alter the NEPA status of the CID, nor will it provide new “ground-up” technical analyses of the impacts of RFETS closure activities. Rather, it will reflect a resource-area-specific characterization of how impacts presented in the CID may be expected to change in light of current closure plans. Thus, it focuses solely on updating the technical resource for cumulative impacts of RFETS closure.

In particular, the Update does not attempt a re-analysis of the scope or methods used in the CID; only the scope of activities analyzed (i.e., past versus current plans) is different. Technical methods for the Update build on those of the CID quantitatively or qualitatively, as applicable to each resource area and the data available (see Section 3.0).

1.2 Approach

The overall approach for the Update was to identify changes in activities, identify and analyze individual impact changes by resource area, and develop a revised cumulative impact characterization. Each step is identified below and discussed in more detail in subsequent sections of the Update, as follows:

1. Identify changes in plans, CID versus current, using 2006 Closure Plan and FY 2000 Work Activity Descriptions (WAD) – Section 2.1.

2. Identify closure activity modifications that result in potentially significant changes in environmental impacts – Section 2.2.
3. Conduct resource-area-specific analysis of resulting changes in environmental impacts – Sections 3.1 – 3.14.
4. Characterize changes in cumulative impacts between currently planned closure activities and those analyzed in the CID – Section 3.15.

Overall results and conclusions regarding NEPA compliance at RFETS were also developed and are presented in Section 4.0.

2.0 CHARACTERIZATION OF CLOSURE ACTIVITY CHANGES

2.1 Activity Changes (CID versus 2006 Plan)

An initial assessment of activity changes between the CID and more recent (FY99) closure plans was presented in the FY98 Annual NEPA Evaluation report (LABAT, 1999); a summary of changes is provided in Table 4-2 of that document. This analysis provided initial insights into closure activity additions and deletions, but because the FY99 site activity baseline was based on a 2010 completion date, it did not capture accelerated closure activities as detailed in the RFETS 2006 Plan.

Using this prior analysis as a framework, a detailed review was conducted of the WAD Description Report for the 2006 Closure Plan (Kaiser-Hill, 1999a) to identify changes between closure activities described in the CID and those in current plans. Where possible, 2006 Plan activities were correlated with those analyzed in the CID. Project reviews documented in the NEPA database and Site planning documents were also surveyed to identify new activities and activity changes.

Based on these comparisons and reviews, activity differences (CID versus 2006 Plan) were screened to identify those modifications, which could result in changes in environmental impacts; results of this activity identification process are listed in Table 2-1. Overall, current closure activities are similar in nature to those analyzed in the CID Closure Case. Primary differences were identified in two general areas:

1. Addition or cancellation of activities: The new plutonium vault has been cancelled, buildings formerly assumed to be preserved for the National Conversion Pilot Project (NCPP) are now to be demolished, and additional interim waste storage facilities are being developed.
2. Acceleration of previously planned activities: Building disposition, waste shipping, and closure material deliveries have been concentrated in the years 2004-2006 as a result of accelerated closure reflected in the 2006 Plan.

Only the volume of low level radioactive waste (LLW) and low level radioactive mixed waste (LLMW) to be shipped off-site for disposal was identified as a significant change in activities previously analyzed in the CID.

2.2 Changes in Environmental Impacts

Each activity area potentially resulting in impact changes was examined to characterize the nature of the differences and the resource areas affected. Consideration was given to both the scope of, and schedule for, the changes. For example, modified impacts could result from scope changes (e.g., addition or cancellation of projects) or from accelerated closure (where the same activities are completed in a shorter schedule). Once impact differences were identified, a list of affected resource areas was developed. This list was compiled based on the nature of activity changes, as well as a survey of impacts analysis methods used in the CID.

Results of the impact and resource area identification processes are presented in Table 2-1. Human health and safety is the resource area affected by the largest number of activity changes, while air quality and traffic/transportation are affected by many activity changes. Socioeconomic impacts from Site closure would be more dramatic than those identified in the CID because closure would occur over a shorter period of time. Impact differences occur because (1) activities will be more concentrated in time than analyzed in the CID (although, in some cases, overall impacts over the closure period would be similar to those presented in the CID); and (2) there have been some cases of substantial changes in closure activities themselves.

Table 2-1.
CID versus 2006 Plan: Activity Modifications Potentially Resulting in Significant Environmental Impact Changes

Activity Modifications	Measure/Comments	Affected Resource Areas
Changes in annual and total waste shipment volumes for LLW/LLMW and sanitary waste.	CID analyzed annual shipments of 31,300m ³ LLW/LLMW and 1,033 shipments of sanitary waste. 2006 Plan shows annual shipments of up to 81,800 m ³ LLW/LLMW and between 0 and 2,855 shipments of sanitary waste (building debris).	Human health Transportation Traffic Air quality
Accelerated shipments of cap materials to RFETS in final 3 years of closure; cancellation of cap for 300 and 700 areas.	Plans to cap the 300 and 700 areas have been canceled. The CID analyzed up to 180,000 shipments of cap materials from off-site locations over a 10-year period; under accelerated closure, 52,116 trips over a two-year period are now planned.	Traffic Air quality Hydrology
Construction/operation of Plutonium (Pu) vault deleted.	Facility canceled.	Human health (radiological and occupational health & safety)
Larger volume of interim transuranic (TRU) waste storage capacity being developed in buildings not originally designed for that purpose.	Buildings 906, 440, 664, 559, and Pad 750, Tents 2 & 10 have been developed for interim TRU waste and transuranic mixed (TRM) waste storage; these and	Human health Air quality On-site transportation

Activity Modifications	Measure/Comments	Affected Resource Areas
	other buildings and tents are being used for LLW/LLMW storage. Uncertainty in timing of shipments to disposal sites may imply indefinite time for storage. Also requires additional on-site movement.	
Accelerated decontamination and decommissioning (D&D) of buildings, especially in final years of closure.	D & D of protected area buildings (and possibly waste storage buildings, above) compressed into last 4 years of closure. Impacts similar to those addressed in CID, but annual impacts greater due to schedule compression.	Human health Air quality Water quality
Omission of NCPP from Site plans.	Buildings 125, 130, 131, 444, 447, 460, 850, 865, and 883, which were to be preserved will be removed.	Human health Air quality Transportation Hydrology
Concrete Crushing and Reuse On-site	Concrete from demolition will now be crushed on-site and used as fill.	Water quality Air quality Noise
Paving Removal	4.6 million ft ² of paved roads, sidewalks, and parking lots will be removed.	Water quality Air quality
New off-site actual or planned activities: - Northwest beltway (W-470) - Reservoir southeast of Site - Expanding commercial & residential development to east and northeast of Site.	Off-site activities which were not known at the time the CID analysis was prepared.	Cumulative Impacts
Overall acceleration of closure activities.	2006 Plan calls for closing the Site in 2006 versus 2010, or later, as analyzed in the CID. Employment, payroll, and associated Site contributions to the local economy would decline over the last three years of closure and dramatically after closure in 2006.	Socioeconomics Land use Accidents

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3.0 ENVIRONMENTAL IMPACT ANALYSIS

The overall approach for characterizing impacts of closure plan changes is described in Section 3.1; resource-area specific analyses are described in Sections 3.2 through 3.14. Cumulative impacts of implementing the 2006 Plan with other off-site activities are discussed in Section 3.15.

3.1 Overview

The impact analysis approach for the CID Update included a review of the original CID methods, examination of available data and analyses (e.g., environmental checklist reviews, RFCA Standard Operating Procedures (RSOP)), and formulation of an impact analysis approach for each of the resource areas addressed in the CID. Methods for characterizing impact differences resulting from the activity changes identified in Chapter 2 were derived to match the available data in each resource area. The approach adopted varies from quantitative to qualitative, as needed to address impacts in individual resource areas; these are discussed in the following sections. Each section describes, for the given resource area, the methodological approach (related to CID methods, as applicable), the degree of quantitative versus qualitative analysis, and the analysis results.

It should be noted that the CID Update does not address impacts of changes in activities associated with special nuclear material (SNM) management, other than cancellation of the plutonium vault and the accelerated schedule for SNM removal. There has been no significant change in the volume of SNM to be managed at RFETS, and DOE has analyzed impacts of SNM management activities (on-site and off-site) in several NEPA documents since publication of the CID. Accordingly, no changes in SNM management impacts are identified. Relevant NEPA documents and their scope with respect to RFETS activities are summarized below.

- *Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site EIS, DOE/EIS-0227F, August 1998; Record of Decision (December 1, 1998); Second Record of Decision (February 18, 1999); Amended Record of Decision (September 1, 1999).* The Records of Decision (RODs) specify that certain plutonium residues and scrub alloy will be prepared (stabilized and/or packaged) at RFETS in preparation for off-site disposal or other off-site disposition as specified in the Preferred Alternatives. The RODs support disposition paths that are consistent with the Rocky Flats Closure Plan. The decision to process stored plutonium-containing materials is a key step toward the goal of completing Site cleanup by 2006, as well as reducing the security risks and safeguards associated with current on-site storage.
- *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Final EIS, DOE/EIS-0229F, December 1996; Record of Decision (January 21, 1997); Amended Record of Decision (August 13, 1998).* The ROD specifies that DOE will phase out storage of all weapons-usable plutonium at RFETS as soon as possible by transporting the pits to Pantex and non-pit plutonium material to Savannah River Site (SRS) if a decision is made to immobilize plutonium at SRS based on the Surplus Plutonium Disposition EIS. The PEIS evaluated off-site transportation impacts of RFETS plutonium to SRS. In the amended ROD,

DOE modified its decision to allow accelerated shipment of all non-pit surplus weapons-usable plutonium from RFETS to SRS beginning in about 2000 and ending in 2002, if SRS is selected as the immobilization disposition site. DOE prepared a Supplement Analysis (Supplement Analysis for Storing Plutonium in the Actinide Packaging and Storage Facility and Building 105K at the Savannah River Site, July 1998) to determine if this change required a supplement to the PEIS and determined that a supplemental PEIS would not be required.

- *Surplus Plutonium Disposition Final EIS, DOE/EIS-0238F, November 1999; Record of Decision (January 11, 2000).* The Department has decided to construct and operate a new immobilization facility at SRS using the ceramic can-in-canister technology. This decision is consistent with the Storage and Disposition PEIS RODs and supports the accelerated off-site shipment of RFETS plutonium to SRS.

3.2 Soils and Geology

Impacts to geology are restricted to the potential for introducing or increasing geologic hazards (e.g., landslides or slumps) for this analysis.

The value of soils at the Site is largely based on potential soil productivity. The main measure of productivity is the quantity and quality of vegetation supported. Soils may also have other values for wildlife. For example, certain types of soils provide habitat for specific wildlife species (e.g., dens or burrows).

3.2.1 Methodology

Impacts to geologic resources are assessed qualitatively, by determining geologic events that could result from changed closure activities. Examples of substantial impacts are initiation of a geologic hazard event (e.g., landslide or slump) or loss of a large quantity of a valuable mineral resource.

To assess soil impacts, changes to soils within affected areas are compared. The CID included calculations of the acreage of affected soils, and addressed the impact of the change. For the Update evaluation, the results of the CID changes are compared to impacts projected under current plans, which are also based on the projected acreage of affected soils. Changes are beneficial when erosion is decreased and soil productivity increased; changes are adverse when soil erosion is increased and soil productivity reduced. Note that the presence of contaminants above background levels does not necessarily impact soil productivity. The degree of disturbance and the presence of non-native plant species are better measures of soil productivity. Evaluation of changed impacts on vegetation is presented in Section 3.9, Ecological Resources.

3.2.2 Results

Impacts to geologic resources at the Site have not changed from those discussed in the CID and will remain minor to nonexistent. Impacts include a minor potential for localized landslides or subsidence (slumping) during construction or excavation activities, and a slightly changed

topography from the recontouring of soils. The restoration of a substantial additional amount of land (land that is currently paved or covered by buildings) and cancellation of the Pu vault in the Update analysis both result in a beneficial impact on soils.

As stated in the CID, areas that are remediated will be reclaimed by recontouring, adding topsoil, and revegetating. Revegetated areas will require monitoring and maintenance (e.g., erosion control, regrading, and reseeding), and control of noxious weeds. The return of restored areas to near baseline conditions after remediation may take several years or longer. Revised closure activities under the Update analysis include the revegetation of an additional 128 acres of land, which is more than double the size of the restored area identified in the CID. This change results from a decrease in cap size (13 acres), demolition of the NCPP buildings (10 acres), and the removal of paved surfaces (105 acres). The increased area to be restored, as well as cancellation of the Pu vault, will have a substantial beneficial impact on soil productivity. The reduced soil disturbance will also result in less potential for siltation due to reduced volumes of soil being moved, stored and distributed.

3.3 Water

Impacts to water for the Update analysis were identified in the form of changes to surface water and groundwater quality, as well as changes in water flows and levels.

Water quality is measured against standards promulgated by State and Federal agencies and in terms of the quality and amount of plant and animal inhabitants. Both surface and ground water may be potential sources of drinking water on- and off-site.

The changed activities that would most affect water quality or flow include cancellation of the 300/700 area cap, concrete crushing and reuse on-site, paving removal, and demolition of the NCPP buildings.

3.3.1 Methodology

Impacts to water resources were measured qualitatively. Impacts are considered substantial if they change the hydrology or alter the quality or quantity of the surface water or groundwater. Such changes are measured by water flow and deterioration of surface water and groundwater quality.

3.3.2 Results

The decision to not cap the 300 and 700 areas will influence the surface water and ground water flow within and around the Site. Surface water runoff will decrease and groundwater infiltration will increase, leading to increased groundwater flows from the 300 and 700 areas and increased downgradient seep flows, although the level of increase is uncertain. Demolition of the NCPP buildings, in addition to removal of the other Site buildings and paved road surfaces throughout the Site, will also alter flow around the Site, reduce surface water runoff and increase groundwater infiltration from precipitation, provided that the areas are revegetated. These latter two changes are considered to be positive impacts. However, the removal of the NCPP buildings

will also mean that groundwater recharge, previously provided by leaking water lines, will cease. The net effect cannot be quantified since the leakage rates and locations are not known. In addition, the building demolition and concrete crushing processes could reduce the quality of the surface water runoff.

Although not specifically related to the 2006 Plan, several projects not originally analyzed in the CID have recently been implemented on-site. These include upgrades to the dam outlets at Ponds A-4 and B-5 and the McKay Bypass Project. The pond upgrades increase the quality of the discharge water and reduce the transport of sediments. Implementation of the McKay Bypass canal alters water transport across RFETS boundaries by eliminating co-mingling of Site discharges with Broomfield water. Specifically, the canal prevents water outflows from the Boulder Diversion Canal from flowing through the Site via Walnut Creek on route to the Great Western Reservoir. Both projects have had a positive impact on surface water resources.

3.4 Air Quality

For predicted on-site and off-site non-radiological air emission concentrations, air quality will, for most air pollutants, remain at or below levels discussed in the CID. The primary difference between the CID and this Update is a likely substantial increase in fugitive dust emissions. Fugitive dust includes total suspended particulate (TSP) and particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}), both of which are considered separately in the CID and in this Update. Note also that although PM_{10} has been and still is regulated separately, the smallest fraction of TSP is particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), which has only recently been identified as a regulated air pollutant. Because $PM_{2.5}$ was not regulated when the CID was completed, it was not considered separately in the CID; likewise it is not addressed separately in this Update.

The radiological air analysis provides a comparison between projected CID doses and revised projections based on the additional actions and shortened timeframe analyzed in the Update. Those radiological air impacts that could be assessed are not projected to be substantially higher than those estimated in the CID. It is assumed that all buildings will be successfully decontaminated prior to demolition and that demolition activities will not affect radiological air emissions. In the event that demolition is not limited to "clean" buildings, the added impact could increase overall radiological air emissions. However, such a change cannot be evaluated until details needed for such analysis (e.g., as would be obtained in an environmental checklist) are obtained.

3.4.1 Methodology for Non-radiological Assessment

Impacts to air quality were, for the most part, assessed quantitatively in the CID. Criteria and hazardous air pollutant impacts are analyzed in this Update by estimating projected emissions from activities identified in the CID and comparing them to applicable standards or guideline concentrations. Based on CID emission estimates, 21 air pollutants were projected to exceed State of Colorado reporting thresholds. The emission rates for these pollutants are presented in Section 5.5 of the CID; methodologies are provided in Appendix B of the CID. Air quality impacts were considered substantial when modeled results exceeded standards or guidelines for

the specific pollutant. The CID used receptors located along or near the Site boundary to establish the highest off-site impacts.

This Update focuses on the same 21 air pollutants and includes a qualitative evaluation since (1) model parameters for conducting a quantitative assessment were not provided in the CID; and (2) there are no apparent substantial modifications in activities that would change generation of these 21 pollutants, other than eliminating them at an earlier point in time (based on accelerated closure—six years of activity rather than ten years assumed in the CID).

Fugitive dust emissions (i.e., TSP and PM₁₀), however, are quantitatively assessed to the extent possible. The calculations used to forecast total emissions are based on the scale of the changed activities and the use of U.S. Environmental Protection Agency (EPA)-approved AP-42 factors for fugitive dust emissions. The changes in emissions from the projected activities are totaled, and the balances are compared to TSP and PM₁₀ emission totals reported in the CID. Emissions from some closure activities are not quantified since representative models and forecast emissions would require accurate schedules, sample information, and detailed planning that are not currently available.

Finally, it is noted that emissions of some organic air pollutants released during remediation activities were not modeled in the CID due to uncertainties (e.g., data limitations for soil concentrations; unknown duration of excavation activities; total disturbed area). This Update also does not evaluate organic air pollutants from remedial activities, since changes are not clearly identified, and a basis for comparison does not exist.

3.4.2 Results of Non-radiological Assessment

The CID estimates indicated that off-site concentrations of criteria and hazardous air pollutants were all below National Ambient Air Quality Standards and State of Colorado air quality standards. In general, the Update results indicate that the projected changes will not impact air quality and that most impacts will be minor to nonexistent. The only notable change identified in this Update is a temporary but substantial projected increase in TSP and PM₁₀.

Non-radiological air pollutant sources for the CID analysis were separated into point sources (steam plant boilers, emergency generators, laboratories, waste management operations, and wastewater treatment systems); and fugitive dust sources (excavation or scraping, bulldozer operation, vehicle travel on roads, and open area wind erosion). These sources were also used in the Update analysis. Three additional sources were considered in the Update analysis which were **not** discussed in the CID: (1) the use of a concrete crushing process to recycle concrete on-site (point source), (2) building demolition (fugitive dust source), and (3) the removal of most paved surfaces on-site (fugitive dust source).

TSP was identified as the primary air quality concern in the CID, for both on-site and off-site receptors; however, the estimated TSP emissions were shown not to have a substantial impact. Environmental restoration activities, such as excavation, equipment operation, and transport of material on unpaved roads, were identified as generating the most fugitive dust. To reflect the 2006 Plan, the Update analysis assumes an accelerated schedule with all closure activities to be

completed within six years. Because environmental restoration activities will occur more rapidly, TSP will be generated more rapidly than previously estimated. In addition, while the projected size of the total capped area has substantially decreased (causing an associated decrease in TSP emissions), the three new sources identified in this Update will increase TSP emissions overall. Derivation of the net change from CID-identified activities is described in the following paragraphs.

In order to provide a conservative estimate of air emissions, the emissions estimate for the condensed six- year period uses a peak year of 2005 which assumes the following: 1,433,000 ft² of buildings will be demolished; 28 percent of capping operations (714,000 ft²) will occur; and 27 percent of paved surfaces (1,236,000 ft²) will be restored (Kaiser-Hill, 1999b). This analysis uses U.S. EPA AP-42 factors and equations to estimate emissions from restoration activities (U.S. EPA, 2000). Note that this analysis uses conservative factors (e.g., dry soils), but that actual emissions can vary dramatically based on soil type, moisture content, mitigative actions, and other factors. This analysis does not provide emission rates suitable for permitting or similar uses, but is only intended to provide a basis of comparison with the CID.

The generic AP-42 factor of 1.2 tons per acre per month is used to calculate TSP. For capping operations, peak year generation will be about 280 tons of TSP, assuming an active period of four months. Using AP-42 industrial wind erosion factors, about 73 tons of PM₁₀ will be generated in the peak year. With respect to the three new sources considered in this Update, the findings were as follows:

- **Concrete Crushing.** The Site's *RFCA Standard Operating Procedure for Recycling Concrete* (DOE, 1999b) describes the use of the concrete crushing process and related impacts. This document projects 9.6 tons of TSP and 1.9 tons of PM₁₀ annually for the use of the concrete crusher.
- **Pavement Removal.** The removal of paved surfaces on-site will also increase fugitive dust. A total of about 4.6 million square feet of paving will be removed (Cheeks, 2000). About 136.1 tons of TSP will be generated in the peak year, 2005, when 27 percent of the restoration will occur (Kaiser-Hill, 1999b). Similar to estimating the emissions from capping operations, this estimation is based on four months of surface disturbance, and use of the AP-42 factor of 1.2 tons of TSP per acre. Using the same assumptions, and a conservative scaling factor of 0.70 (derived from AP-42 emission factor equations for uncontrolled open dust sources), about 95.3 tons of PM₁₀ will be generated in the peak year.
- **Building Demolition.** Air emissions estimates from building demolition were not included in the CID. They also are not included in the quantitative estimate in this Update. The 2006 Plan identifies peak year demolition of 1,433,000 ft² of buildings. This activity will result in extensive disturbance at each building site, not only while the actual demolition is accomplished, but for the separation, loading, and hauling of materials and wastes. Under both the CID closure scenario and this Update, the emissions from demolition will be substantial, and considered alone may well equal or exceed emissions from other activities.

The CID TSP and PM₁₀ totals are compared to the total projected changes in Table 3-1. The CID total annual emissions of TSP and PM₁₀ are taken from Section 5.5.2. The CID did not identify a peak year, but assumed that activities, and therefore emissions, would be equal on a yearly basis over a ten-year period. The restoration (capped) area identified in the CID was larger than currently planned and would generate higher emissions, but closure activities and emissions would be less on an annual basis as a result of spreading emissions out equally over the ten-year period. Table 3-1 shows a moderate peak year increase of 99.2 tons (30 percent) in TSP. The very conservative scaling factor used to derive PM₁₀ from TSP projections for paved area removals leads to an increase of 98.6 tons (138 percent), which would be a very substantial increase in a regulated criteria pollutant.

Table 3-1.
Projected TSP and PM₁₀ Totals (tons per year) in Update and CID

Activity	TSP	PM ₁₀
UPDATE		
Capping Operations	280.0	73.0
Concrete Crushing (not in CID)	9.6	1.9
Removal of Paved Surfaces (not in CID)	136.1	95.3
Total	425.7	170.2
CID		
Restoration Activities	326.5	71.6

Estimated concentrations of other criteria and hazardous air pollutants provided in the CID were well below the most restrictive occupational exposure limit, with the exceptions of sulfur dioxide, nitrogen dioxide, and carbon monoxide (these on-site concentrations approached 50% of the most restrictive occupational exposure limit). The primary sources of these pollutants were diesel-powered emergency generators used to supply back-up power at the Site. These results are presented in Tables 5.5-5 and 5.5-6 of the CID. Reported impacts are presented in terms of total concentrations, including contributions from other nearby sources and ambient background concentrations. For activities set forth in the 2006 Plan, there will be little change in the use of emergency generators, steam plant boilers, waste and wastewater treatment operations, or in other nearby sources and ambient background concentrations. Maximum daily emissions would remain about the same as forecast in the CID. The principal difference would be a more rapid reduction in total emissions, as the accelerated closure reduces the number of sources.

Organic air pollutants may be released during the excavation of certain source areas during environmental restoration. Due to the short-term nature of these excavations, limited soil concentration data, and uncertainty associated with estimating organic emissions during excavation, air emissions from these activities were not modeled in the CID. Potential impacts on workers and the public from these activities were considered to be adequately addressed in future Proposed Action Memorandums and project-specific risk assessments that would identify and propose mitigation measures to lessen the human health risks to the on-site worker and

members of the public. The CID also assumed that ambient monitoring would be performed during the actual excavation to ensure that air emissions remain within acceptable levels per the requirements of the project-specific Health and Safety Plan. The Update analysis does not identify substantial changes to restoration and potential organic air emissions. Project-specific risk assessments and ambient monitoring will continue to be used, and a substantial impact or change from the CID conclusions regarding organic air emissions is not projected.

3.4.3 Methodology for Radiological Assessment

The CID analysis presented the air quality impacts of radionuclides in terms of annual doses to three receptors: a co-located worker, a maximally exposed individual (MEI) at the Site boundary, and the local population within a 50-mile radius (assumed to be 2.7 million people). CAP88-PC, a Gaussian plume dispersion model, was used in the CID to estimate these doses, based on emissions from six point sources and two area sources at RFETS. Four of the six point sources include emissions from both operations and environmental restoration activities, while emissions from the other two point sources and the two area sources are a result of restoration activities only. These sources are listed in Table 3-2.

This methodology uses the CID results, based on the CAP88-PC model, as a baseline of annual radiological doses to the three receptors. The Update analysis reviews changed or additional activities, and develops a quantitative radiological result where possible. An upper bound multiplier is used to develop risks to the receptors as a result of identified activity changes.

Table 3-2.
Radiological Emissions Sources

Source Description	Emissions from Operations	Emissions from Restoration
Point source: stack, NE quadrant	X	X
Point source: stack, NW quadrant	X	X
Point source: stack, SE quadrant	X	X
Point source: stack, SW quadrant	X	X
Point source: LTTD Facility, contribution from OU2		X
Point source: LTTD Facility, contribution from OU5		X
Area source: environmental restoration of OU2		X
Area source: environmental restoration of OU5		X

3.4.4 Results of Radiological Assessment

In the CID, the annual dose for the co-located worker, MEI at the Site boundary, and local population within 50 miles was estimated to be 5.3 mrem, 0.23 mrem, and 22.9 person-rem, respectively. With Site closure now scheduled for 2006, the contribution of operations emissions to the total emissions from the first four sources is assumed to remain the same as in the CID analysis through 2006, and then cease. Emissions due to restoration activities are likely to be higher on an annual basis until Site closure than those estimated in the CID, but the exposure would terminate several years sooner (2006) than under the previous closure schedule.

The CID does not provide a sufficient level of detail to correlate the previously estimated doses with the activity types evaluated in this CID Update, precluding the use of modeling or an activity-specific scaling factor for the previous doses. However, some bounding risk characterizations can be derived, based on the information that was presented in the CID:

- Assuming that 100 percent of the dose from the first four point sources is due to operations, information in Table B-19 of the CID indicates that the annual dose from operations to a co-located worker and MEI at the Site boundary could be as high as 5.3 and 0.22 mrem, respectively. Under the 2006 Closure Plan, this same annual dose would be expected to continue through 2006, and then cease.
- Assuming that 100 percent of the dose from the first four point sources is due to environmental restoration, along with the dose from the other four sources that are known to be entirely due to restoration, information in Table B-19 of the CID indicates that the annual dose from restoration to a co-located worker and MEI at the Site boundary could be as high as 5.4 and 0.23 mrem, respectively. An upper-bound multiplier was identified by comparing the risks predicted for involved workers in the CID to those from the changed activities (see Section 3.8). The greatest change was observed in worker risks for decontamination and decommissioning (D&D) activities, where the collective worker dose is estimated to be as much as six times higher than in the CID analysis for a one-year period.
- Demolition of buildings must be considered. Although Section 5.5.1 of the CID states that emissions from D&D of all existing buildings are encompassed in the air quality impacts evaluation of the closure case, the detail presented in Appendix B of the CID does not support this statement, leaving some uncertainty as to whether this activity was actually included. It is not possible to provide any reasonable comparable estimate of the impacts on air quality from D&D of structures without conducting extensive dispersion modeling using site- and building-specific input assumptions. However, overall radiological air quality impacts from this activity will be higher than the total of those estimated in the CID, conservatively assuming that D&D activities were not included in that analysis. The magnitude of the increase will depend on the detailed plan for conducting these activities, the level of decontamination that is accomplished prior to demolition, and on the emission controls that are implemented, which will be evaluated in planning studies and monitored during D&D of each building or area.
- Although the CID did not present information on emissions sources used to estimate the collective dose to the general population in a 50-mile radius, the sources used to estimate doses to the co-located worker and MEI were also likely used in the general population dose estimates. If so, a six-fold increase would result in an upper-bound collective population dose of 137 person-rem (22.9×6), or 0.05 excess latent cancer fatalities (LCFs) in the exposed population. Again, it is uncertain whether this risk estimate accounts for D&D of buildings. To develop an estimate that would provide a reasonable prediction of the radiological air quality impacts and associated health risks from the 2006 Closure Plan would require detailed building characterization data and dispersion modeling.

The upper-bound co-located worker doses, exclusive of D&D activities, are well within the administrative site limit of 750 mrem. Similarly, the MEI doses, exclusive of D&D, are substantially lower than the maximum annual allowable radiation dose of 100 mrem for a member of the public from DOE-operated nuclear facilities (DOE Order 5400.5). These doses do not denote a substantial radiological air quality impact. Note, however, that emissions associated with D&D may not be included.

3.5 Traffic

Impacts to traffic are measured in terms of increased highway and road congestion resulting from Site-related traffic. Despite the 2006 accelerated closure plan, on-site and off-site traffic levels will decrease relative to those presented in the CID. Off-site activities will also contribute to the traffic impacts. As previously analyzed in the CID, RFETS shipping activities will most likely occur during off-peak hours, thereby minimizing the number of shipments made during morning and afternoon rush hours.

3.5.1 Methodology

Impacts to traffic are measured quantitatively. Quantitative data were obtained from Site personnel, Site documents, and a review of Jefferson County traffic counts along local roads. Impacts are considered substantial if they alter the congestion or flows of traffic in the Site vicinity. An example of a substantial impact to traffic would be increased daily commute times of local traffic on Highway 93 and other surrounding highways and roads.

Commuter Traffic

To derive a current projection of trips per year and commuter mileage per year, the following methods were used. To estimate trips per year, the estimated work force for each year was multiplied by two; this accounted for trips to and from the Site each day. The results were then multiplied by 260 (estimated number of workdays per year using the five workdays per week multiplied by 52 weeks per year). Kaiser-Hill provided annual work force projections for FY99 through FY07 (Kaiser-Hill 1999c). Commuter miles per trip were based on values given in the CID: 2.3 million commuter trips per year at approximately 52 million commuter miles (Table A-15 in CID), or approximately 23 miles per trip. This same trip distance was used in the CID Update analysis. A Site workforce level of 3,575 was identified for the CID closure case.

Off-site traffic data for Highway 93 and Indiana Street between Highways 128 and 72 were reviewed to help analyze traffic impacts. The data used to compare Rocky Flats traffic were from 1996. To determine impacts, changes to traffic entering and leaving the Site were compared to those documented in the CID (Table A-17).

Materials Shipping

The number of shipments of materials and waste to and from RFETS were compared, using updated estimates of annual shipments obtained from Kaiser-Hill (Brown, 2000).

3.5.2 Results

Commuter Traffic

RFETS workers contribute to the traffic on Highway 93 and Indiana Street between Highways 128 and 72. In 1996, an overall estimated 29,000 daily commuters were counted on these highways (Jefferson County, 2000). Assuming the contributions from other destinations remains steady, total personal vehicle traffic in RFETS area is expected to increase and then gradually decrease as the Site progresses toward closure, compared to estimates in the CID analysis. Local commuter traffic impacts from RFETS workers are summarized in Table 3-3.

Table 3-3.
Local Commuter Traffic Impacts

Year	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Projected Workforce	5,750	5,400	5,250	5,000	4,750	4,650	4,000	2,500	0
Estimated annual commuter miles (millions) ^a	68.8	64.6	62.8	59.8	56.8	55.6	47.8	29.9	0
CID annual commuter miles (millions)	52.	52.	52.	52.	52.	52.	52.	52.	52.
Change (millions)	+16.8	+12.6	+10.8	+7.8	+4.8	+3.6	-4.2	-22.1	-52
Change (%)	+32%	+24%	+21%	+15%	+9.0%	+6.9%	-8.0%	-42%	-100%

^a23 miles/trip x 2 trips/day x 260 days/year x projected workforce

The CID analysis estimated the number of commuter trips at 22,526,400 over a ten-year period, or 2.3 million trips per year, and a total of 516,980,880 commuter miles over a 10-year period. Current projections are for 19,396,000 trips and 446,108,000 commuter miles over an eight-year period (FY99-FY07).

Materials Shipping

The CID used a ten-year shipping period; waste shipments per year represented an annual average. For LLW/LLMW and sanitary waste, the previous analysis estimated 94,480 waste shipments over a ten-year period (CID Table A-14), while the current analysis estimates 24,928 over the seven-year period between FY00 and FY06. There were 887 actual shipments in FY99 (Brown, 2000). This indicates that local traffic due to waste shipments will generally decrease compared to the previous analysis.

Capping materials will contribute an additional 52,116 total shipments using a standard 16-ton tandem dump truck (Lindsay, 2000) over a two-year period. The CID estimate was more than

double this total number, with 112,585 shipments spread evenly over a ten-year period. Shipments will likely begin sometime between FY03 and FY05. The annual impacts on traffic will be slightly more than double those previously predicted for the two-year transport period, but there will be no contribution to traffic impacts from capping materials during the remainder of the CID closure period.

Combined with the current growth and urban sprawl of the Denver Metropolitan area the effects of increased traffic entering and leaving the Site through FY2000 will become intensified. This is further discussed in Section 3.15, *Cumulative Impacts*. Off-site businesses, as well as highway and commercial construction, will also contribute to Highway 93 traffic congestion.

The eventual decreases in commuter traffic, off-site waste shipments and the amount of capping/environmental restoration material brought on-site, indicate that the impacts associated with the current 2006 Closure Plan will be of a smaller magnitude than originally estimated, and traffic associated with Site operations will be eliminated earlier. Thus, a positive long-term impact on local traffic is associated with the accelerated closure plan.

3.6 Transportation

Changes in site activities between those analyzed in the CID and those in the 2006 Plan affect the amount of transportation of both non-hazardous, hazardous, and radiological materials, resulting in changes to the transportation risks predicted in the previous analysis.

3.6.1 Methodology

In most cases, the same methodology, unit risk values, and assumptions used in the CID analysis were applied to calculate risks based on the revised activities. Risks were estimated as follows:

- LLW/LLMW/Sanitary Waste Transportation: In this CID Update, the annual volume of LLW/LLMW and sanitary waste transported on-site was assumed to be the same volume transported off-site in each category.

For transportation of LLW, LLMW, and sanitary waste, on-site and off-site vehicle-related risks, in terms of LCFs were calculated using the same method as in the CID:

$$\text{number of trips} \times \frac{\text{miles}}{\text{trip}} \times \frac{1.6 \times 10^{-7} \text{ LCFs}}{\text{mile}} = \text{vehicle-related LCFs}$$

For vehicle-related accident risks associated with off-site transportation, unit transportation accident fatality rates (fatalities/mile) used in the CID were applied to the revised number of shipments to each destination.

For cargo-related risks from on-site transportation of LLW/LLMW, the CID Update analyses applied the single trip doses (mrem/trip) to involved workers and co-located workers that were calculated in the previous analysis to the new shipping volumes.

For radiological risks from off-site transportation of LLW/LLMW, a per-trip dose was derived from the results presented in the previous analysis:

$$\frac{\text{dose (rem or person-rem)}}{\text{number of trips}} = \text{per-trip dose (rem or person-rem)}$$

The per-trip dose was applied to the updated number of trips required to transport LLW/LLMW to off-site destinations, resulting in revised collective and MEI doses for workers and the public. This same approach (calculation of per-trip risks from CID results) was used to derive unit risk factors for radiological and chemical risks from accidents during off-site transportation.

- Cap Materials Transportation. As in the previous analysis, the trip distance was assumed to be 12 miles. Applying the vehicle-related risk factor of 1.6×10^{-7} LCFs per mile and the new estimate for number of shipments, updated risks were calculated.
- Increased TRU/TRM Storage. Risks from on-site transportation associated with increased on-site storage of TRU/TRM waste were analyzed in *DOE/EA 1303: Environmental Assessment, Finding of No Significant Impact, and Response to Comments for Temporary Storage of Transuranic and Transuranic Mixed Waste*. The assumptions and methodology used in that analysis differ from those presented in the previous analysis, but reflect more recent information about ongoing and planned activities.

For vehicle-related risks, the EA applied the risk factor of 1.6×10^{-7} LCFs per mile to the number of trips made, assuming each trip was 1 mile. The same approach was used in the previous analysis, except that the CID assumed each on-site trip was 8 miles.

For cargo-related risks, it was assumed that the duration of each on-site trip was 10 minutes, with an average trip distance of 1 mile. The involved worker is exposed for the 10-minute transit time at a distance of 3 feet from the waste, and is also exposed at a distance of 1.6 feet for 50 percent of two load/unload activities, each of which takes 50 minutes. The transport index is 3 mrem/hr at a distance of 1 meter (3.3 feet) for contact handled (CH) TRU/TRM waste. This transport index was adjusted for the distances evaluated in the EA using the inverse square rule. The resulting equation estimated that each trip transporting TRU/TRM waste on Site would result in a single-trip dose to an involved worker of 10.6 mrem. The co-located worker was assumed to be 10 feet from the truck as it passes at a speed of 5 miles per hour. The line-source approximation for exposure at 10 feet from the truck is 30 percent of the transport index value. The dose to the MEI is the dose rate at 10 feet from the truck (1.08 mrem/hr) multiplied by the length of time required for the truck to pass a given point moving at 5 miles per hour (6 seconds). The dose to a co-located worker from on-site transportation was estimated to be 0.0018 mrem per trip. These assumptions were taken from the *Waste Management Programmatic Final EIS* (DOE, 1997).

The per-trip doses used in the EA are within 10 percent of the per-trip doses for "radioactive waste" used in the previous analysis. The only significant difference in the methodology is the revised assumption that on-site trips are 1 mile instead of 8 miles. The analysis of

changes in impacts between the CID and CID Update includes both the results as reported in the CID and the EA, as well as normalized results to exclude the effect of this revised assumption on the comparative risk evaluation.

- Accelerated D&D of Buildings. The revised waste volume estimates (analyzed under "LLW/LLMW/Sanitary Waste Transportation" above) include the materials resulting from the updated D&D schedule. Transportation risks from movement of D&D materials are included in those risk estimates.
- Omission of National Conversion Pilot Project. Transportation of waste generated by D&D of the buildings previously planned for the NCPP are included in the LLW/LLMW/Sanitary Waste transportation analysis.

3.6.2 Results

Table 3-4 summarizes the updated estimates of risk from LLW/LLMW and sanitary waste transportation under the 2006 Closure Plan; it also compares them to the risks predicted in the CID. A general discussion follows and detailed results are presented in Appendix A, Tables A-1 through A-10.

Changes in Annual Shipment Volumes for Low-Level, Low-Level Mixed, and Sanitary Waste

Annual total LCFs due to routine, vehicle-related impacts of on-site waste transportation for 2000 to 2005 (see Table A-1) range from 75 percent less to 128 percent greater than those in the previous analysis. Total program LCFs are decreased by 34 percent. The decrease is due to an overall 47 percent decrease in predicted shipments using the most recent waste shipping forecast, compared to the previous analytical assumption that there would be a total of 3,776 trips each year for ten years.

Annual radiological doses to workers from routine, on-site transportation of LLW/LLMW for 2000 to 2005 (cargo-related) range from 89 percent less to 42 percent greater than those in the previous analysis (see Table A-2). Total estimated program dose to a worker decreased by 41 percent, mainly due to updated information on the decreased relative amount of operations-derived waste, which has a significantly higher dose rate than restoration-derived waste.

The bounding accident for on-site transportation of SNM in the previous analysis still represents the upper limit of on-site transportation accident risks. No changes to on-site accident transportation impacts were identified, although the potential for such accidents will be eliminated once SNM is removed from the Site in 2002.

**Table 3-4.
Transportation Risk Comparison**

Activity Change	CID	2006 Plan
Changes in annual shipment volumes for low-level, low-level mixed, and sanitary waste (overall decrease in volume)	<p><i>On-site</i></p> <p>Vehicle-related: 0.048 LCFs over total program span</p> <p>Cargo-related: 37 rem to involved worker over total program span 6.7×10^{-3} rem to co-located worker over total program span</p> <p><i>Off-site Truck</i></p> <p>Vehicle-related, routine: 0.19 LCFs over total program span</p> <p>Vehicle-related, accident: 6.0 fatalities over total program span</p> <p>Cargo-related, routine: Workers: 260 person-rem over total program span MEI worker: 0.9 – 5.9 rem/yr Public: 873 person-rem over total program span MEI public: 3.2×10^{-5} – 2.0×10^{-4} rem/yr</p> <p>Cargo-related, accident: Radiological: 6×10^{-4} – 0.091 LCFs/yr Chemical: cancer risk $\leq 1.1 \times 10^{-8}$/yr, noncancer hazard quotient $\leq 5.4 \times 10^{-7}$</p> <p><i>Off-site Rail</i></p> <p>Risk ratios calculated for truck vs. rail transport on equal volume basis</p>	<p><i>On-site</i></p> <p>Vehicle-related: 0.030 LCFs over total program span</p> <p>Cargo-related: 22 rem to involved worker over total program span 0.0040 rem to co-located worker over total program span</p> <p><i>Off-site Truck</i></p> <p>Vehicle-related, routine: 0.045 LCFs over total program span</p> <p>Vehicle-related, accident: 1.5 fatalities over total program span</p> <p>Cargo-related, routine: Workers: 135 person-rem over total program span MEI worker: 0 – 12 rem/yr Public: 370 person-rem over total program span MEI public: 0 – 0.0021 rem/yr</p> <p>Cargo-related, accident: Radiological: 0 – 0.090 LCFs/yr Chemical: cancer risk $\leq 2.1 \times 10^{-9}$/yr, noncancer hazard quotient $\leq 3.7 \times 10^{-6}$</p> <p><i>Off-site Rail</i></p> <p>Same risk ratios as calculated in the previous analysis will apply to the new waste volumes</p>
Accelerated shipments of cap materials to RFETS in final three years of closure.	0.022 LCFs/year as vehicle-related impacts of shipment from off-site sources to on-site destinations	Vehicle-related impacts = 0.05 LCFs/year in 2004 and 2005 only
Construction/ operation of Pu vault deleted.	<p><i>On-site—SNM consolidation to B371</i></p> <p>Vehicle-related: 2.4×10^{-5} LCFs/year</p> <p>Cargo-related: 2.8×10^{-4} LCFs/year for involved workers 4.9×10^{-8} LCFs/year for co-located workers</p> <p><i>Off-site—transport SNM to SRS</i></p> <p>Vehicle-related: 3.4×10^{-5} LCFs/year</p> <p>Cargo-related: 7.7×10^{-3} LCFs/year</p>	<p><i>On-site—SNM consolidation to B371</i></p> <p>Same as previous analysis.</p> <p><i>Off-site—See Storage and Disposition PEIS (DOE, 1996); Supplement Analysis (DOE, 1998); and amended ROD (DOE, 1999c)</i></p>

Activity Change	CID	2006 Plan
Larger volume of interim TRU storage capacity being developed in buildings not originally designed for that purpose.	Vehicle-related: 7.7×10^{-5} LCFs/year Cargo-related: 2.6×10^{-3} LCFs/year for involved worker 0.12 mrem/year for MEI co-located worker	Vehicle-related: 4.3×10^{-5} LCFs/year Cargo-related: 2.3×10^{-3} LCFs/year for involved worker 0.49 mrem/year for MEI co-located worker
Accelerated D&D of buildings, especially in final years of closure.	Not specifically analyzed in CID.	Revised waste volume estimates include the materials resulting from the revised D&D schedule; analyzed under "Changes in Annual Shipment Volumes" above.
Omission of National Conversion Pilot Project from Site plans.	Not specifically analyzed in CID.	Revised waste volume estimates include the materials resulting from D&D of these buildings; analyzed under "Changes in Annual Shipment Volumes" above.

Total annual LCFs for 2000 to 2005 for routine, vehicle-related off-site transportation risks decrease from 23 percent to 92 percent compared to those in the previous analysis (see Table A-3). Total program LCFs decreased by 77 percent. This decrease is due to a significant decrease in the number of trips to each site, as follows:

	<u>Previous Analysis</u>	<u>CID Update</u>
Total Program Trips to NTS	26,710	15,900
Total Program Trips to Envirocare	55,460	4,007

The annual shipment volumes in the two analyses are not as different as the total program volumes for cargo-related off-site transportation (see Table A-4). It is likely that the decrease in total risk is mainly due to the absence of the previous conservative assumption that a higher annual volume would be sustained over the entire ten-year period previously evaluated.

In the CID, Envirocare was assumed to receive only operations-derived LLMW. In the CID Update, Envirocare is assumed to receive all LLMW. For combinations of waste type and destination evaluated in both the CID and CID Update, the following comparisons are made:

- The total program collective worker dose decreased 48 percent compared to the risks predicted in the previous analysis.
- The destination-specific total program MEI worker dose range from 94 percent less to 73 percent greater than the previous results.
- The total program collective public dose decreased 57 percent compared to the previous analysis.
- The destination-specific total program MEI public dose ranges from a 40 percent decrease to a 320 percent increase.

The differences from the previous analysis can be attributed to updated information on a decreased relative amount of operations-derived waste, which has a significantly higher dose rate

than restoration-derived waste; to differences in the destinations assumed for each waste shipment; and to realistic assumptions regarding annual shipment volumes. (The CID analysis used very conservative simplifying assumptions that a higher annual volume would be sustained over the entire ten-year period analyzed.)

A 74 percent decrease in total program fatalities due to vehicle-related accident impacts is predicted compared to the estimates presented in the previous analysis (see Table A-5). The differences from the previous analysis can be attributed to differences in the destinations assumed for each waste shipment, and to the absence of the very conservative simplifying assumption that a higher annual volume would be sustained over the entire ten-year period analyzed previously, which corresponds to a decrease in total program shipment-miles.

In the CID Update, Envirocare is assumed to receive all LLMW in the analysis of off-site transportation risks due to cargo-related accidents (see Table A-6). In the CID, Envirocare was assumed to receive only operations-derived LLMW. For combinations of waste type and destination evaluated in both the CID and CID Update, the following comparisons are made:

- Destination-specific excess radiological LCFs from total program shipments range from 94 percent less than to 71 percent greater than those predicted by the previous analysis.
- Cancer and non-cancer risks from chemicals in LLMW range from 96 percent less than to 64 percent greater than those previously predicted.

The differences from the previous analysis can be attributed to increased waste volumes in some years; updated information on a decreased relative amount of operations-derived waste, which has a significantly higher dose rate than restoration-derived waste; differences in the destinations assumed for each waste shipment; and to realistic assumptions regarding annual shipment volumes. (The CID analysis used very conservative simplifying assumptions that a high annual volume would be sustained over the entire ten-year period analyzed.)

For risks from off-site transportation by rail (see Table A-7), the previous analysis found the risk ratios for equal volume shipments by truck vs. rail. The same ratios will still apply to the new waste volumes.

Accelerated Shipments of Cap Materials to RFETS in Final Three Years of Closure

The estimated LCFs from vehicle emissions during cap materials shipments are presented in Table A-8. For the two years in which cap materials shipments will occur, risks are higher than the previously estimated risks of 0.02 LCFs/year. However, these risks are predicted to only occur in years 2004 and 2005, instead of all program years, resulting in a total program decrease in vehicle-related LCFs, from 0.2 to 0.1.

Construction/Operation of Plutonium Vault Deleted

SNM consolidation to B371 will still occur, consistent with previous analysis; no change in on-site transportation risks. Off-site transportation risks from SNM were analyzed in the Storage and Disposition PEIS, amended ROD, and supplemental analysis.

Larger Volume of Interim TRU Storage Capacity Being Developed in Buildings Not Originally Designed for that Purpose

The updated risks from increased on-site transportation of TRU/TRM waste due to storage of larger volumes are presented in Tables A-9 and A-10. A total program decrease of 61 percent in vehicle-related risks was predicted by the analysis in the TRU/TRM temporary storage EA, compared to the risks estimated for on-site transportation associated with TRU/TRM waste in the previous analysis. Although a comparison of the previous (60 trips) and current (270 trips) annual TRU/TRM waste on-site shipment rates alone would have predicted an increase in risk, the noted decrease is due to the revised, more realistic assumption that on-site trips are 1 mile in length instead of 8 miles. Therefore, current estimates represent 270 1-mile trips = 270 on-site trip miles, compared to the previous assumption of 60 8-mile trips = 480 on-site trip miles. When the results of the two analyses are "normalized" to assume an equal distance traveled per on-site trip, risks increase by 214 percent compared to the CID analysis.

Overall, total program risks to the involved worker decreased by 39 percent, and risks to the co-located worker increased by 186 percent, compared to risks estimated in the previous analysis for cargo-related effects of on-site TRU/TRM waste transportation. The decrease is primarily due to the revised assumption that on-site trips are 1 mile in length instead of 8 miles. When the results of the two analyses are "normalized" to assume an equal distance traveled per on-site trip, risks increase by 389 percent for involved workers and 2190 percent for co-located workers.

Accelerated D&D of Buildings, Especially in Final Years of Closure

Revised waste volume transportation estimates include the materials resulting from the new D&D schedule. Therefore, these risks are included in those analyzed under "LLW/LLMW/Sanitary Waste Transportation" above.

Omission of National Conversion Pilot Project from Site Plans

Transportation of additional wastes generated by D&D of these buildings is addressed in the analysis of transportation impacts from LLW/LLMW/sanitary waste discussed above.

3.7 Utilities and Energy

Utility usage at the Site includes water, steam, natural gas, fuel oil, electricity, and nitrogen gas. Impacts to utilities and energy would not change from those analyzed previously, although the reduction in usage associated with the changed activities would occur earlier than those previously analyzed.

3.7.1 Methodology

Impacts to utilities and energy are assessed qualitatively, by determining differences in water, steam, natural gas, fuel oil, electricity and nitrogen gas requirements that could result from changed closure activities. For this evaluation, the results of the CID are compared to currently projected utility and energy requirements.

3.7.2 Results

Impacts on utilities and energy at the Site will be less as a result of changed closure activities since utility usage and energy requirements will now be essentially eliminated. Previously, a limited number of buildings (e.g., NCPP) would remain on Site after closure, although at dramatically reduced levels once building D&D was complete. Accordingly, the CID analysis indicated reduced utility usage and the likely use of small-scale water treatment units after DD&D rather than keeping the water treatment plant. With the removal of all buildings at the Site, as well as cancellation of the plutonium vault, DOE's utility usage requirements would be eventually eliminated resulting in even lower impacts (i.e., more favorable) to utilities and energy than those previously analyzed. In addition, the reduction and eventual elimination of Site utility and energy requirements will now occur earlier under the CID update given the accelerated closure schedule.

3.8 Human Health

Changes in site activities affect the estimates of health risks to both workers and members of the public, resulting in changes in projected closure health risks from those predicted in the CID.

3.8.1 Methodology

In several cases, the worker and public health risks presented in the CID were aggregated over multiple closure activities, precluding direct comparison with the risks estimated for changes in the activities evaluated in this Update. The following approaches were used:

- LLW/LLMW Transportation: No specific methodology or dose estimate was provided in the CID for packaging LL/LLM waste. However, an individual dose to workers involved in packaging soil was derived from the data provided in Table B-1 of the CID:

$$\frac{930 \text{ person-mrem}}{50,000 \text{ yd}^3} \div 15 \text{ people} = 0.00124 \text{ mrem / yd}^3$$

This dose per cubic yard value was applied to the revised waste projections to derive a new, revised estimate of the risk to an individual worker involved in packaging activities.

- Cap Materials Transportation: Risks from transporting additional capping materials on-site are limited to transportation impacts, which are addressed in Section 3.6 of this Update.

- Deletion of Interim Storage Vault for Plutonium from Site Plans: No specific methodology or dose estimate was provided in the CID for construction and operation of the new interim plutonium storage vault. Radiological risks to workers and the public from SNM storage in the vault will be eliminated under the new plans; please refer to *Storage and Disposition of Weapons-Usable Fissile Materials PEIS* (DOE/EIS-0229), the *Supplement Analysis for Storing Plutonium in the Actinide Packaging and Storage Facility and Building 105-K at the Savannah River Site* (July 1998), and its amended Record of Decision (Federal Register 63:43386-43392). After all SNM is moved off-site in FY02, annual occupational safety incidents will decrease by the amount attributed to SNM management as an organizational function area from Table C-26 of the CID:

$$\frac{5 \text{ incidents}}{200,000 \text{ hours}} \times \frac{2,000 \text{ hours}}{\text{individual}} \times \text{individuals involved in SNM management} = \text{incidents}$$

The number of individuals involved in SNM management is listed in the CID as 191 in a peak year, and 102 in 2006.

- Increased TRU/TRM Storage: Risks to involved workers, co-located workers, and members of the public from TRU/TRM waste storage were analyzed in *DOE/EA 1303: Environmental Assessment, Finding of No Significant Impact, and Response to Comments for Temporary Storage of Transuranic and Transuranic Mixed Waste*. The assumptions and methodology used in the EA analysis differ from those previously used, but reflect more recent information about ongoing and planned activities.
- Accelerated D&D of Buildings: Risks due to accelerated D&D of buildings compared to the yearly risks presented in Table B-5 of the CID were approximated, based on the revised D&D schedule assumptions presented in the description of this activity change in Section 2.0. The same total worker risk from D&D of each building cluster that was calculated in the CID was re-distributed over time, according to the revised schedule assumptions, to obtain the estimates presented in the CID Update.
- Omission of National Conversion Pilot Project: The radiological doses predicted for workers from operation of the National Conversion Pilot Project will not occur since the project has been omitted from Site plans. Incremental construction and health risks will occur from D&D of the buildings originally included in this program. Doses presented in the CID for a D&D of a generic 100,000-ft² building with no wet process areas were used to predict the risks associated with D&D of Buildings 883 (105,600 ft²) and 865 (40,000 ft²):

$$105,600 \text{ ft}^2 + 40,000 \text{ ft}^2 \times \frac{87.509 \text{ (total dose)} - 58.523 \text{ (wet process area dose) person-mrem}}{100,000 \text{ ft}^2} \\ = D \& D \text{ dose (person-mrem)}$$

3.8.2 Results

Changes in Annual Shipment Volumes for Low-Level, Low-Level Mixed, and Sanitary Waste

Table 3-5 provides revised worker doses from waste packaging, according to the following formula:

$$\frac{0.00124 \text{ person-mrem}}{\text{yd}^3} \times \frac{\text{yd}^3}{0.7646 \text{ m}^3} \times \text{annual LLW / LLMW m}^3 = \text{annual dose (mrem)}$$

Table 3-5.
Worker Doses for LLW/LLMW Packaging

Annual Dose (mrem)							Total
2000	2001	2002	2003	2004	2005	2006	
13	11	49	130	53	100	0	360

The CID does not list specific doses for LLW/LLMW packaging to which those derived for the CID Update can be directly compared. Total program risks to the public would be lower than those previously associated with LLW/LLMW packaging, because total estimated shipping volumes are lower. Concentration of shipping in the last three years of closure results in estimated annual risks higher than those for the waste volumes analyzed in the CID (by up to 160 percent) in some years and lower (by as much as 79 percent) in other years, depending on waste shipment schedule.

Accelerated Shipments of Cap Materials to RFETS in Final Three Years of Closure

Risks from this activity are addressed in the transportation impact assessment, Section 3.6.

Construction/Operation of Plutonium Vault Deleted

Risks are summarized as follows:

- Worker exposure from SNM consolidation: 6.9 person-rem annually for B371 operation, through 2002 (CID Table B-6); no change.
- Worker exposure from Pu checks and security: 6.4 person-rem annually (CID Table B-6) only through 2002.
- Nonradiological health and safety incidents: 5-10 less incidents predicted annually with SNM management eliminated as organizational function area.

There are no changes from previous plans in worker exposure from SNM consolidation. Worker exposure from plutonium checks and security would be eliminated after 2002, when all SNM has been shipped off-site. The number of nonradiological health and safety incidents attributable to SNM management activities is estimated to be 5-10 annually, based on the data in the CID; incident predictions would decrease by this amount when SNM management ceases after 2002.

Any public risks from SNM storage will be eliminated following all transfer of SNM off-site by 2002.

Larger Volume of Interim TRU Storage Capacity Being Developed in Buildings Not Originally Designed for that Purpose

Risks are summarized in Table 3-6.

Table 3-6.
Risks from TRU/TRM Waste Storage

	2000	2001	2002	2003	2004	2005	2006	Total
Involved Worker (mrem)	500	500	500	500	500	500	500	3500
Co-Located Worker MEI (mrem)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	18.9
Public (LCFs)	0.00062	0.00062	0.00062	0.00062	0.00062	0.00062	0.00062	0.00434

The previous analysis presented a CEDE of 44 rem from TRU waste storage in a maximum year and 572 rem CEDE for the program. However, these numbers are not derived in the detailed Human Health & Safety appendix to the CID, so it is not clear on which assumptions they are based. The methodology used in the *EA for Temporary Storage of TRU and TRM Waste* resulted in findings that are not directly comparable to those in the CID; however, the risk estimates listed above reflect the most recent data and assumptions. The revised TRU/TRM waste storage volumes analyzed in the EA are expected to have resulted in increased risks compared to the previous analysis, since they represent a higher TRU/TRM on-site storage volume.

Accelerated D&D of Buildings, Especially in Final Years of Closure

Risks are presented in Table 3-7.

Table 3-7.
Risks from Accelerated D&D

Building Cluster	Total	Person-Rem (Workers)									
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
B371	71.4	0	0	0	0	0	7.1	14	36	14	0
B707/750	31.9	0	0	0	0	0	3.2	3.2	26	0	0
B771/774	81.2	0	0	0	8.1	16	16	16	24	0	0
Misc Prod Zone	7.9	0	0	0	0	0	0	0	0	0	0
B776/777	132	0	0	0	13	13	40	53	13	0	0
B779	17.1	3.4	5.1	8.6	0	0	0	0	0	0	0
B881	25.3	0	0	0	0	0	0	0	10	15	0
B886	13.8	5.5	6.9	1.4	0	0	0	0	0	0	0
B991	4.2	0	0	0	0	0	0	1.7	2.5	0	0
Misc Prod Zone	7.9	0	0	0	0	0.79	0.79	0.79	4.7	0.79	0

Building Cluster	Total	Person-Rem (Workers)									
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
TRU	0.3	0	0	0	0	0	0	0	0	0	0
Ind Zone	3.4	0	0	0	0	0	0	0	0.34	2.4	0.68
Buffer Zone	0.15	0	0	0	0	0	0	0	0	0.06	0.09
TOTAL	414	8.9	12	9.9	21	30	67	89	120	33	0.8

Total program risks would be the same as those estimated in the CID. However, risks for any given year will be as much as six times higher, since the time span for completing D&D activities has been compressed. All worker exposures will be managed to ensure that individual doses do not exceed the Federal limit for radiation workers of 5 rem annually. Risks to members of the public specifically due to D&D of buildings were not listed separately in the CID. It is expected that public risk changes as a result of accelerated closure will follow the same pattern as those for workers, showing similar total program risks with higher annual risks in peak D&D years.

Omission of National Conversion Pilot Project from Site Plans

Cancellation of this project brings the projected worker and public exposures from project operation to zero; the previous analysis had estimated an annual worker dose of 1.021 person-rem for this operation. D&D of Buildings 883 and 865 is estimated to result in a total collective worker dose of 42 person-rem, based on the geometric area of each building compared to the generic 100,000-ft² building evaluated in the CID. This will be in addition to the previously calculated worker doses for D&D of RFETS buildings.

Human Health Risk Comparison and Summary

Table 3-8 provides a comparison of the risks predicted in the CID to those predicted under the 2006 Closure Plan.

Table 3-8.
Health Risk Comparison

Activity Change	CID Impacts	Revision Impacts
Increases in annual shipment volumes for low-level, low-level mixed, and sanitary waste (Note: current projections indicate an overall decrease in total closure volume)	<p><i>Workers</i></p> <p>No specific dose listed for LL/LLM waste packaging. A value of 0.93 person-rem annually for 15 individuals packaging restoration-derived soil waste was cited. This is equal to an individual worker dose of 62 mrem/year.</p> <p><i>Public</i></p> <p>No specific dose listed for LL/LLM waste packaging.</p> <p>Health risks from transportation are presented in Section 3.6.</p>	<p><i>Workers</i></p> <p>Annual individual dose for packaging restoration-derived ranges from 5.4 to 104 mrem, with a program total of 330 mrem. Not directly comparable to CID risks; see discussion in Section 3.8.2.</p> <p><i>Public</i></p> <p>Higher than CID estimates, by as much as 100%, in years 2002, 2003, and 2005. Lower by as much as 90% in other years. Total program risk lower.</p>

Activity Change	CID Impacts	Revision Impacts
Accelerated shipments of cap materials to RFETS in final three years of closure.	Risks addressed in transportation impact assessment.	Risks addressed in transportation impact assessment.
Construction/ operation of Pu vault deleted.	<p><i>Workers</i></p> <p>Annual dose for SNM consolidation = 6.9 person-rem Annual dose for Pu checks and security = 6.4 person-rem Previously analyzed total dose for SNM management = 426 rem CEDE</p> <p><i>Public</i></p> <p>Doses due specifically to SNM storage not listed separately in CID.</p>	<p><i>Workers</i></p> <p>No change in SNM consolidation exposures. • Exposure for Pu checks and security will end after FY02 instead of FY13 resulting in lower total program risk.</p> <p><i>Public</i></p> <p>Movement of all SNM off-site by 2002 instead of 2013 will decrease RFETS total program risk from this source compared to the previous program.</p>
Larger volume of interim TRU storage capacity being developed in buildings not originally designed for that purpose.	<p><i>Workers</i></p> <p>TRU storage dose = 44 person-rem CEDE in maximum year, 572 rem CEDE for previously analyzed total¹</p> <p><i>Public</i></p> <p>Doses due specifically to TRU storage not listed separately in CID.</p>	<p><i>Workers</i></p> <p>Involved worker dose = 500 mrem/year Co-located worker MEI = 2.7 mrem/year annual average Note: Updated and previous risks are not directly comparable; however, the activities analyzed in the Update are expected to result in an increase in risks.</p> <p><i>Public</i></p> <p>Annual LCFs = 6.2×10^{-4}</p>
Accelerated D&D of buildings, especially in final years of closure.	<p><i>Workers</i></p> <p>Total worker dose = 414 person-rem over a 19-year period.</p> <p><i>Public</i></p> <p>Risks due specifically to D&D of buildings not listed separately in CID.</p>	<p><i>Workers</i></p> <p>Total worker dose = 414 person-rem over a 10-year period.</p> <p><i>Public</i></p> <p>D&D of all buildings by 2006 instead of 2015 will increase the contribution of this activity to annual public risks but with a decreased duration. The total program risks associated with D&D will remain the same.</p>
Omission of National Conversion Pilot Project from Site plans.	<p><i>Workers</i></p> <p>Annual dose for NCPP operation = 1.021 person-rem for 5 individuals, or 0.204 rem/year each.</p> <p><i>Public</i></p> <p>Risks due specifically to D&D of NCPP buildings not listed separately in CID.</p>	<p><i>Workers</i></p> <p>No radiological exposure from omitted NCPP operation. Additional radiological risk from D&D of buildings = 42 person-rem</p> <p><i>Public</i></p> <p>No exposure from omitted NCPP operation. Public risks from D&D of buildings addressed in Section 3.5 (Air Quality).</p>

¹ The CID presents inconsistent units for this risk estimate. Evaluation of information provided in the CID indicates that it should be person-rem, which is the interpretation used in this analysis.

3.9 Ecological Resources

Changes to impacts in ecology are principally related to an increase in the area to be revegetated, and removal of several buildings that would have remained in the previous analysis. The increased revegetated area will be beneficial for plant and animal life at the Site. The removal of additional buildings will remove habitat that some birds (e.g., finches, swallows) use for nesting purposes.

3.9.1 Methodology

Impacts to ecological resources were assessed semi-quantitatively in the CID. The CID analyzed seven resource categories: vegetation, wetlands, sensitive habitats, wildlife, aquatic fauna, species of special concern, and biodiversity. The changes addressed in this Update are generally assessed qualitatively, although the areas to be revegetated are quantified. This analysis assumes an additional 128 acres of land, including a decrease in cap size (13 acres), the demolition of the NCPP buildings (10 acres), and the removal of paved surfaces (105 acres). The potentially affected ecological resources summarized in this section include vegetation, wetlands, and wildlife. Other resource categories will either not be impacted or will experience minimal changes. A description of ecological resources currently found at the Site is provided in Section 4.9 of the CID.

Methods used in the impact assessment vary according to the type of impact and the ecological resource. In general, the impact assessment is based on a comparison of the location of the changed Site activities in relation to the location of ecological resources (short-term impact), and an evaluation of the eventual condition of the Site (long-term impact). Various types of construction and demolition activities (e.g., earthmoving, site remediation), and changed projected conditions (e.g., paved areas versus revegetated areas) are the primary topics evaluated in this section. Ecological impacts include a loss of vegetation or wildlife, a loss of vegetative or wildlife productivity, wildlife injury or mortality, and a loss or modification of habitat. A substantial adverse impact is noted if there is a loss of greater than ten percent of native plant species, if noxious weeds invade and occupy more than ten percent of a specific plant community where none existed prior to the impact, or if more than five years are required to reestablish ground cover (per the CID). For this analysis, the reestablishment of ground cover is not limited at five years; adverse weather conditions and other factors may extend the period of restoration. Beneficial impacts are noted if additional habitat is created or existing habitat is enhanced.

3.9.2 Results

Impacts to vegetation at the Site would be adverse if disturbed areas are repopulated with weed species. The additional area (128 acres) to be revegetated should be managed similarly to other restored areas, with weed control a part of the management. Beneficial ecological impacts will be realized if soil restoration is suitable for an adequate reestablishment of native plant species, and if weeds are controlled. Areas that are remediated will be reclaimed by recontouring as necessary, adding topsoil, and revegetating the area. The additional area to be revegetated is anticipated to be managed similarly to other restored areas. The CID notes that the impact will not be substantial, based on the use of adequate controls for revegetation and weed control.

Revegetated areas will require monitoring and maintenance (erosion control, regrading, and reseeded), and control of noxious weeds. In this Update analysis, a significantly larger area is to be restored, and a long-term beneficial impact is projected. Even though a completely native grassland may be impossible to achieve, restoration, even to a lesser degree, will have a positive effect on plant and animal species at the Site, due to the size of the area

Wetlands will generally not be affected by the changes to the CID closure case. Wetlands in the industrial area were considered in the CID, and no new potential disturbances of wetlands have been identified.

Some species of wildlife would benefit from the removal of buildings that would have remained under the CID closure case; other species would be adversely impacted. The removal of buildings will remove habitat that some birds (e.g., finches, swallows) use for nesting purposes. However, the increased area of vegetation would be beneficial for animal species that are dependent on prairie vegetation (e.g., voles).

3.10 Cultural Resources

The CID notes that impacts to cultural resources are considered substantial if the action results in: 1) loss or modification of cultural resources eligible for the National Register of Historic Place (NRHP), 2) failure to comply with the state procedures for implementing cultural resource management practices, or 3) loss of any information that impedes efforts to reconstruct the prehistory or history of the region. Site closure will result in substantial impacts to cultural resources through the removal of historical buildings identified as eligible for the NRHP. However, these impacts have already been adequately mitigated through documentation of all 64 RFETS historic buildings in the Historic American Engineering Record, including those NRHP-eligible NCPP buildings which are analyzed in this Update.

3.10.1 Methodology

As indicated in the CID, it is unlikely that remediation activities would uncover paleontological resources or cultural resources associated with the traditional use of the Site by Native American cultures since none have been previously identified. In addition, prehistoric resources at the Site are not considered substantial to the region's archaeological record. Therefore, the focus of this Update is limited to analyzing impacts to historic structures. Impacts are assessed qualitatively, by determining actions, specifically building removal actions, that could result from changed closure activities. For this evaluation, the results of the CID changes are compared to current projected changes. In particular, the number and historical significance of the nine buildings associated with the NCPP were identified and considered.

3.10.2 Results

Of the nine NCPP buildings that will now be demolished rather than preserved, five are located within the Rocky Flats Plant Historic District, and therefore eligible for the NRHP. These include Buildings 444 (original depleted uranium production), 460 (stainless steel fabrication), and 883 (rolling and fabricating), all of which are considered primary contributors; and Buildings

125 (standards laboratory) and 865 (metal R&D laboratory) which are both considered secondary contributors. However, mitigation measures have already been implemented that will reduce the impacts to these buildings to a non-adverse level.

DOE has completed consultation with the Colorado State Historic Preservation Officer (SHPO) regarding mitigation measures for the 64 NRHP eligible facilities, including the five NCPP buildings. Specifically, the history of the Rocky Flats Plant, including all 64 buildings within the Historic District, has been properly documented in the Historic American Engineering Record (HAER-CO-83-T) (Kaiser-Hill 1999d). Such documentation, consisting of a narrative report, engineering drawings and photographs, meets the requirements of the Programmatic Agreement signed by the DOE Rocky Flats Field Office, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation; and has been accepted by all responsible parties. Since this documentation includes the five NCPP buildings, it effectively reduces to a non-adverse level the adverse impacts to historic resources associated with the changed conditions. Therefore, changed activities addressed in this CID Update would not affect impacts to cultural resources.

3.11 Noise

For this analysis, noise impacts from changed closure activities are considered. The changed impacts may affect on-site workers and off-site receptors, but the impacts will not vary substantially from the impacts listed in the CID. That is, currently planned closure activities are projected to cause at most minor increases in ambient sound levels relative to those originally presented in the CID.

3.11.1 Methodology

Impacts from noise are assessed by establishing likely noise levels from closure activities (e.g., trucking, demolition), determining attenuating factors, and comparing the projected noise from the Site activities to ambient conditions. Noise impacts to off-site receptors and on-site workers are evaluated. Levels of noise considered to be a nuisance are regulated, as described in the CID. For example, on-site noise levels must be maintained at below the daytime standard of 80 decibels (dB) and nighttime standard of 75 dB, since the Site is classified as an industrial facility. The noise levels are measured at a distance of 25 feet or more from the property line as measured on the A-scale (dBA).

3.11.2. Results

The CID found that noise levels from industrial activities within the Site boundary were not distinguishable from background traffic noise levels. Noise levels from on-site construction, environmental restoration, waste disposal, demolition, and other activities were not expected to be perceptible at off-site locations. Changes in Site activities will not increase noise levels off-site, since activities will be similar to actions discussed in the CID, and due to the distance from the developed area to Site boundaries and other attenuating factors (e.g., structures, topography, vegetation, wind).

The primary source of noise to nearby residential areas remains traffic movement along local streets and state routes. Off-site traffic will increase relative to the levels addressed in the CID, since more cleanup activity and associated trucking will occur during the shorter closure time period. The additional traffic will increase noise along the routes that will be used. The effects will be short-term, occurring intermittently during daylight hours, and lasting for several years. Most public reviews of traffic noise by federal and state agencies consider a doubling (i.e., a 10 dB or greater) of sound to be a moderate to substantial increase. An increase of less than 10 dB is considered a minor increase. This evaluation is subjective, and must be considered in context of other factors, such as noise frequency and public attitudes about the specific noise. Because traffic (including truck traffic) is already prevalent along the proposed trucking routes, and because the additional traffic noise would not cause a doubling of noise levels, the potential impact is considered low.

Although activities will occur more rapidly, and will likely result in slightly higher noise environment for workers, the potential health effects on workers will not change. On-site activities will still include construction, loading, hauling, demolition and similar activities. Off-site activities will consist of waste and material transport from the Site and daily employee trips. Workers will be required to wear adequate hearing protection when necessary, and additional noise from construction and demolition-related activities will not impact workers.

3.12 Socioeconomics

The primary socioeconomic factors considered in the CID analysis and re-examined in the CID Update are employment, local economy, population and housing (including personal income) and quality of life. These factors were selected because they are general indicators of economic conditions and can be compared to available information on the state and local economics. They are defined in the CID as follows:

1. *Site employment* is comprised of three related types:
 - *Direct Site employment*, which includes people employed by DOE and the Site contractor (Kaiser-Hill Company and first tier team of subcontractors).
 - *Other direct employment*, which includes other subcontractors and vendors hired by DOE and the Site contractor.
 - *Indirect employment*, which includes employment in the local economy as a result of spending by Site employees and vendors.
2. *Local economic issues* include the purchase of goods and services by the Site contractor and DOE and the demand for retail, office, and industrial real estate related to these purchases. "Local economy" refers to the six-county Denver Metropolitan Area.
3. *Population and housing* includes the number of households associated with the Site, the population within these households, median household income, and housing values.
4. *Quality of life* in the Denver Metropolitan Area is determined by several factors according to the CID, including the area's climate, proximity to wilderness, scenic, and

natural amenities, abundance of recreational opportunities, and availability of nearby urban amenities. Other quality of life issues include crime, air pollution, and a range of growth management issues (e.g., traffic, open space, and education). Aside from environmental contamination issues, the CID found that Site activities do not notably influence quality of life in the Denver Metropolitan Area.

In the CID, changes in each of the above socioeconomic indicators were considered substantial if the Site activities resulted in a change of 10 percent or more in any of the socioeconomic factors considered. Given the Site mission of closure, the CID identified a substantial decrease for each indicator except quality of life, which was expected to improve with Site cleanup. Since the Site's ultimate disposition has not changed, a similar change in each indicator is also expected from the activities analyzed in this Update. The primary difference is that Site plans now focus on closure in 2006, under an accelerated schedule from that analyzed in the CID. The net result is that the overall socioeconomic impacts associated with currently planned activities and analyzed in the CID Update are not expected to change from those previously analyzed.

3.12.1 Methodology

A combination of quantitative economic and financial models, such as input-output models, and qualitative descriptions of socioeconomic impacts were used in the original CID socioeconomic analysis. This Update is more qualitative in nature and limited in its focus since the Site's ultimate disposition, closure, is unchanged from the CID; this end result is the primary driver for analyzing socioeconomic impacts at the Site. Particularly relevant to the Update analysis are: 1) updated demographic projections (e.g., population, employment) beyond 2006 for the State of Colorado, Denver Metropolitan Area, and local counties (Boulder and Jefferson); and 2) the extent to which the Site's influences on employment, the local economy, population and housing, and quality of life may have changed since the CID. Both sets of variables are considered relevant because significant changes in either could result in changed levels of impact from those analyzed in the CID.

Specifically, the Update analysis focuses on the following:

- Evaluating the changes in activities previously analyzed against updated population and employment projections for the Site county(ies), Denver Metropolitan Area, and the State of Colorado, to identify potential changes in the socioeconomic indicators.
- Determining whether the changes in socioeconomic indicators, if any, affect the level of impact previously analyzed in the CID; and
- Re-examining socioeconomic impacts in light of the accelerated closure schedule.

Like the CID, the Update addresses impacts on the adjacent counties, the six-county Denver Metropolitan Area, and the state as a whole; out-of-state impacts are not addressed.

3.12.2 Results

An evaluation of the changes in activities in this Update indicate that Site influences on the socioeconomic indicators have not changed from the CID, primarily because the ultimate disposition of the Site, closure, has not changed. Updated population, employment, and economic growth projections are also consistent with (or only slightly higher than) the growth rates identified in the CID. Tables 3-9 through 3-12 summarizing the updated demographic data referenced below are found at the end of this section. Specific issues are discussed below.

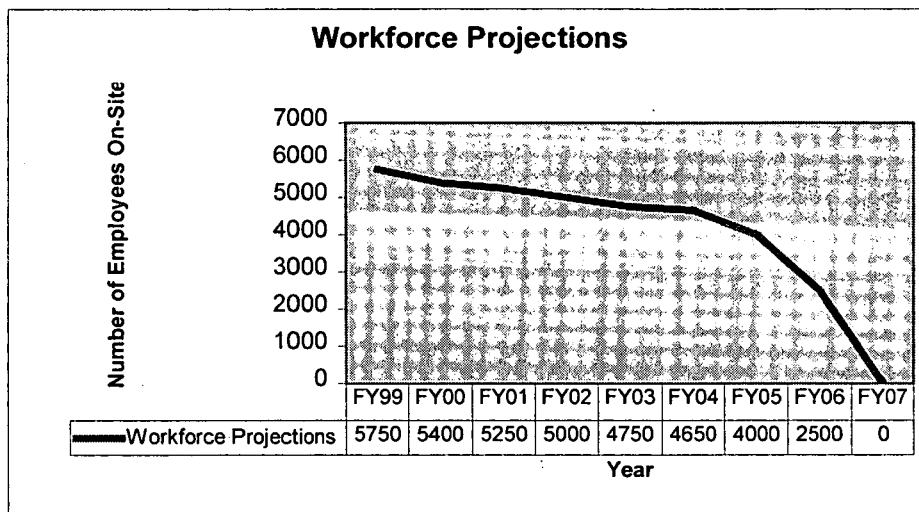
- Population in both the State of Colorado and the Denver Metropolitan Area is currently projected to increase at an average annual rate of approximately 2 percent (see Table 3-9); this is slightly higher than the average annual growth rate projections in the CID (1.4 percent for Colorado and 1.2 percent for Denver Metro).
- Jefferson and Boulder Counties were within the top ten fastest growing Colorado counties in the 1990s based on numeric change. Jefferson County experienced a population increase of 58,226 between 1990 and 1997, more than a 13 percent total increase (reflecting a 1.8 percent average annual rate). During the same period, Boulder County increased by 36,278, more than 16 percent (2.2 percent annually). Population growth for Boulder and Jefferson Counties through 2010 is expected to continue at a slightly lower annual growth rate than in the 1990s (see Table 3-9), but at a slightly higher average annual rate than projected in the CID. The CID identified a 1.1 percent and 0.8 percent average annual growth rate for Boulder County and Jefferson County, respectively, between 1994 and 2006.
- Employment in the State of Colorado and Denver Metropolitan Area is currently projected to increase at an average annual rate of 2.1 percent (same as CID) and 1.7 percent (1.4 percent in the CID), respectively. Jefferson County employment is currently forecast to increase at a slightly lower average annual rate than the State or Denver Metro area, i.e., 1 percent between 1995 and 2010 (as compared to 0.9 percent in the CID between 1994 and 2006), with slower growth rates projected in the latter part of the 10-year period. The average annual growth rate for Jefferson County drops to 0.5 percent between 2000 and 2005, and 0.1 percent between 2005 and 2010 with the anticipated reduction in Site-related jobs (see Table 3-10).
- Of the major Denver employment sectors identified in the CID – manufacturing/production, retail and services – the services sector remains the largest and continues to grow the fastest. The CID indicated an average annual growth rate of 1.8 percent for the services sector between 1994 and 2006 (24.1 percent total). More recent projections indicate that the services sector will far exceed all other industries in job creation from 1995 to 2005, adding 26,420 new jobs annually. The Services industry is currently projected to grow at a rate of 50.1 percent from 1995 to 2005 (5.0 percent annually) and will expand significantly from a 26.5 percent share of total non-agricultural wage and salary employment in 1995 to 31.7 percent in 2005. Trade (wholesale and retail) will be the second fastest growing industry from 1995 to 2005. Goods-producing industries will contribute only modestly to employment, with higher growth expected from the government sector (17.3 percent); transportation, communications and public utilities sector (TCPU) (21.1 percent); and the

finance, insurance, and real estate (FIRE) sector (16.7 percent) (*Colorado Department of Labor and Employment, Job Outlook Summary*).

- In the communications area, Denver now has the third highest concentration of Information Technology sector jobs in the U.S., including computer manufacturing, telecommunications and software programming (Metro Denver Network, 2000).
- Unemployment rates in Colorado have consistently remained below the national rate and updated rates for 1999 are even lower than the 1996 rates presented in the CID. Table 3-11 presents unemployment rates through 1999. Unemployment rates are an indirect measure of job opportunities for members of the labor force looking for work or considering a change in jobs. They are an important measure in assessing RFETS closure impacts because, in the future, Site workers may be seeking other job opportunities in the local economy.
- The economic base of Colorado remains structurally diverse. This diversification is its key economic strength going into the 21st century, bringing greater economic stability, and enabling the state to absorb employment shocks more effectively than areas with more specialized economies. The diversity of the metropolitan area economy is illustrated by the variety of sectors represented in the 15 top private-sector employers (Table 3-12). Site employment, represented by the Site contractor (Kaiser-Hill) is currently ranked as the 15th largest private-sector employer in the area (3,300 employees); this compares to a ranking of 14 (3,400 employees) in December 1996 (*Denver Business Journal*, 1996, as cited in CID). This similar ranking would appear to indicate that the Site currently exerts similar influences on the Denver Metropolitan Area and Colorado economies as the CID indicated it did in 1996.
- Direct Site employment and other direct employment in 1999 totaled 5,750 workers. This includes DOE employees, DOE's Site contractor (Kaiser-Hill) and the first tier team of subcontractors, as well as other subcontractors and vendors hired by DOE and the Site contractor. This represents a decrease of 14 percent in direct Site employment levels since 1994 (6,561 workers as cited in CID Baseline Case).
- Direct Site workforce projections through closure are shown in Figure 3-1.
- Total employment related to Site activities in 1999 is estimated at 13,800, applying the same multiplier (2.4) used in the CID to the 1999 direct site workforce projections. This includes direct, other direct, and indirect employment, and represents a decrease of 14 percent in total Site employment since 1994 (as cited in CID).

Projected decreases in Site workforce and associated annual payroll in this Update are not expected to change significantly from those previously analyzed, except at an accelerated rate, since all workers would lose their Site-related jobs. Likewise, the projected decreases in annual purchases of goods and services by DOE and the Site contractor, as well as projected decreases in households (and consequently, in housing demand) are not expected to change from those previously analyzed. Because of the anticipated job growth in the overall Denver and Boulder MSAs, however, it is assumed that many current RFETS employees would remain in the area

Figure 3-1. Workforce Projections at RFETS: 1999 - 2007



Kaiser-Hill 1999

rather than relocating, thus reducing the adverse impact on the local housing market. The fact that RFETS workers live throughout the region also dilutes these housing market impacts.

As originally reported in the CID, Site closure is expected to result in substantial negative contributions to socioeconomic indicators due to decreases in the levels of employment and spending at the Site. However, in both the CID and Update scenarios, it is anticipated that these changes would be counterbalanced by projected growth in other segments of the local economy. Colorado has a highly educated, technically trained workforce, and a strong base of entrepreneurial activity in high-growth, high-tech fields. It is well positioned in the advanced technology and service industries of the future. Over the past decade, Colorado's economy has evolved into one of the Nation's strongest and most diversified. The highly-regarded DRI McGraw Hill forecast projects that Colorado will be one of the national leaders in Gross State Product (GSP) growth in the next ten years as well, based on projected employment growth, industry mix, and productivity gains. (US Department of Commerce, 1999; DRI McGraw Hill, 1997).

Continued growth in local economic activity is expected to facilitate job transition for Site workers and lessen the impact on businesses that sell goods and services to RFETS. Impacts of currently planned closure activities, while potentially occurring earlier than reported in the CID, are not expected to result in substantial overall socioeconomic impacts to the Denver Metropolitan Area and to Colorado, although there may be short term, localized impacts. While the loss of 13,800 jobs under the CID Update is a substantial decrease, it represents only 1 percent of the projected employment for the Denver Metropolitan Area in 2007 (down from 1.2 percent in the CID), and the job loss would be spread over a 7-year period. Further, the length of

time available to workers and suppliers to plan for the transition will minimize the adverse impacts to income.

Finally, with respect to quality of life, the CID noted that Site activities do not notably influence quality of life in the Denver Metropolitan Area, other than perceptions of potentially hazardous environmental contamination. This "stigma effect" is distinct from actual physical environmental effects in that it involves public perceptions rather than actual conditions. Given the Site's continuing mission of cleanup and closure, the net impacts to quality of life remain positive and therefore have not changed. In fact, under accelerated closure plans evaluated in this Update, the positive impacts of closure will occur sooner than predicted in the CID.

Table 3-9.
Population Projections for Colorado

Area	1995 (Actual)	2000	2005	2010	Avg. Annual Percent Change
Colorado	3,741,575	4,227,389	4,629,421	5,059,914	+2.20%
Denver Metro	2,098,965	2,351,083	2,534,456	2,737,944	+2.0%
Boulder County	253,678	285,476	308,433	335,104	+2.0%
Jefferson County	484,394	524,391	547,178	569,366	+1.1%

Source: U.S. Bureau of the Census (1995 Actual); Colorado Department of Local Affairs (Projections 2000 - 2010)

Table 3-10.
Projected Labor Force by Place of Work

Area	1995 (Actual)	2000	2005	2010	Average Annual Percent Change
State	2,003,555	2,353,971	2,593,307	2,785,245	2.1%
Denver Metro	1,170,918	1,365,883	1,470,519	1,545,966	1.7%
Jefferson County	282,387	324,101	331,943	334,125	1.0%

Source: Colorado Department of Local Affairs

Table 3-11.
Unemployment Rates

Area	1994	1995	1996	1997	1998	1999
U.S. Average	6.1	5.6	5.4	5.0	4.6	4.4
Colorado	4.2	4.2	4.2	3.3	3.8	2.9
Denver MSA	3.9	3.8	3.8	2.8	3.2	2.4
Boulder- Longmont MSA	3.7	4.1	3.8	2.8	3.3	2.7

¹ MSA stands for Metropolitan Statistical Area

Source: Colorado Department of Labor and Employment, 1999

**Table 3-12.
Top 15 Employers in the Denver Metropolitan Area**

Company	Type of Industry	# of Employees
US West	Telecommunications	14,501
Columbia	Health Care, Hospitals	10,059
Centura Health	Health Care, Hospitals	9,000
King Soopers	Grocery	8,960
United Airlines	Airline	7,700
Lockheed Martin Astronautics	Aerospace Research and Production	7,382
Lucent Technologies	Telecommunication Equipment	6,000
IBM Corporation	Computer Software and Services	5,050
Coors Brewing Company	Malt Beverages	5,000
Safeway, Inc.	Grocery	5,000
Tele-Communication, Inc.	Cable Television	4,134
Aramark Services, Inc.	Food Concessions	3,750
StorageTek	Computer Storage Devices	3,750
Ball Corporation	Aerospace Research & Development	3,350
Kaiser-Hill Company, LLC	Environmental and Engineering	3,300

Source: Denver Metro Chamber of Commerce, 1999

3.12.3 Land Use Impacts

The CID did not analyze impacts to land use. This Update addresses it qualitatively only to indicate that the current land use will change when closure is complete. The Site's future use has not yet been determined, however, and will depend in part upon the final cleanup configuration, under the Rocky Flats Cleanup Agreement (RFCA). Depending on the final Site configuration, the end state may open the Site to potential land uses not possible under current conditions and contamination levels.

3.13 Environmental Justice

The first step in determining whether there would be disproportionately high or adverse effects on minority and low-income populations is to identify the presence of such populations in the

affected area, defined as a 50-mile radius of the Site. Updated demographic data were reviewed in this analysis and are essentially unchanged from previously analyzed data. The population within 10 miles of the Site is predominantly non-Hispanic white. Most of the minority population in the region between 10- and 50 miles from the Site is concentrated in the City and County of Denver and western Adams County. In the region between 10 and 50 miles from the Site, 65 percent of the population reported in the 1990 Census annual income greater than \$30,000. The U.S. Bureau of Census characterizes \$12,700 as the "statistical poverty level." The US average median income is \$30,000.

A review of the updated data indicates that there are no minority or low-income neighborhoods (i.e., population greater than 50 percent minority) within a 10-mile radius of the Site. Therefore, no environmental justice impacts are anticipated within 10 miles of the Site. Human health impacts to the public within a 50-mile radius of the Site were also evaluated. Public health risk assessments focused on risks to the MEI of the off-site population and in the evaluated transportation corridors. Only in cases where the MEI are at high risk would there be a potential for disproportionately high or adverse health risks to minority or low-income communities. If risks to the MEI were low, no segment of the population would experience disproportionately high or adverse health risks, including minority or low-income populations. Impacts from radiological and nonradiological air emissions during routine operations, accidents, and off-site transportation have been addressed in Sections 3.6, 3.8 and 3.14 of this Update. Because the level of increased risk to the MEI in each analysis was determined to be small, no high or adverse human health impacts are anticipated for any segment of the population, including minority and low-income populations. Therefore, no environmental justice impacts could occur.

3.14 Accidents

The CID addressed a spectrum of potential accidents involving special nuclear material (SNM), transuranic (TRU), and low-level wastes; the analysis addressed both ongoing storage and maintenance as well as closure activities (e.g., residue stabilization). Primary CID findings were:

- Risks from accidents involving SNM management bound risks from other operations and closure activities, and
- Risks from accidents drop significantly 1) once SNM has been treated, packaged, and stored in the Interim Storage Vault (ISV) and 2) shipped off-site.

Current closure plans call for implementation of the same basic SNM management activities (e.g., residue stabilization, SNM packaging, storage, and shipment), although construction of a new ISV has been eliminated. Only the schedule for these activities has changed, with removal of SNM from RFETS scheduled for 2002 under the 2006 Plan. Thus, the technical basis for accident analysis does not change significantly under currently planned closure activities, and the basic CID conclusions regarding impacts from accidents remain valid. Accident risk reduction from SNM storage in the ISV does not apply under the 2006 Plan, but SNM removal, assumed to occur in 2014 in the CID, will be accomplished in 2002, so that full SNM accident risk reduction

will be effected earlier under current plans and will significantly reduce overall SNM-related accident risks.

Risks associated with accidents involving other radiological material forms (e.g., TRU, LLW) remain significantly smaller than those from SNM management. Under the 2006 Plan, these risks will also be eliminated earlier than assumed in the CID, thus reducing overall accident risks from closure activities involving these waste forms.

Although not identified as a major change in closure plans, residue treatment and stabilization, which was analyzed as part of Building 707 operations in the CID, is being conducted in Building 371. Because the latter building is more seismically robust, seismic risks from residue treatment will be lower than presented in the CID, thus offsetting the 10% risk increase for the closure case over the baseline case reported in the CID.

In summary, annual impacts from accidents under the 2006 Plan will be no higher (and lower for some accident scenarios) than reported in the CID. Overall accident risks will be significantly lower under current plans because of accelerated removal of radiological materials from the Site, thus eliminating risks several years earlier than analyzed in the CID.

3.15 Cumulative Impacts

The primary focus of the CID was on cumulative impacts resulting from on-site activities implemented between 1996 through Site closure. Likewise, the focus of the CID Update is on cumulative impacts resulting from changed on-site activities, from the present time through the new closure date of 2006. Both the CID and this Update also address potential cumulative impacts, as defined by the Council on Environmental Quality (CEQ) (40 CFR 1508.7). Cumulative impacts result from the proposed Site activities and the effects of other actions taken during the same time in the same geographic area (i.e., off-site), regardless of what agency or person undertakes such other action. In addition to the development previously analyzed in the CID, the following new developments have been identified:

- **Ralston Asphalt Company and Quarry:** 7 miles south of RFETS on Highway 93.
- **BFI Landfill:** about 2 miles south of RFETS on Highway 93.
- **Highway 93 improvements/construction:** 2-mile stretch of highway improvements beginning about 2 miles south of RFETS. Duration: Through end of CY 2000 (CDOT, 2000).
- **Construction of Jefferson County Athletic Facility:** about 7 miles south of RFETS on Highway 93.
- **Fortune Reservoir Construction:** located southeast of RFETS, built on a dry tributary of Clear Creek and will have a volume of 10,000 acre-feet.

- **Proposed C-470 Expansion/Extension:** proposed highway expansion into City of Golden, south-southeast of Site.
- **Division of Wildlife (DOW) Acquisition of Site Property:** DOE turned over a portion of RFETS property to Division of Wildlife.
- **Open Space Purchase:** City of Boulder purchased open space west of Site; west side of Highway 93.
- **Continued development at Interlocken.**
- **Continued development of residential areas northeast of the Site.**

3.15.1 Methodology

Like the CID analysis, the analysis of this Update is qualitative, due to the relative uncertainty involved with future non-DOE projects. Information was obtained by visual inspections near the Site and telephone conversations with State agencies. Information regarding the construction and improvements to Highway 93 were received from the Colorado Department of Transportation (CDOT, 2000).

3.15.2 Results

All activities mentioned in the CID analysis will continue to contribute to the impacts associated with RFETS closure activities. Table 3-13 summarizes the impacts contributed by the new off-site activities. As seen in Table 3-13, increased traffic congestion around RFETS appears to be the most noticeable impact. Several of the projects, including the Highway 93 construction and Jefferson County Athletic Facility, have already begun construction and may be completed within the next year. Adverse impacts associated with the increased traffic congestion would be short-term. The C-470 expansion is a proposed project; its proximity to RFETS is unknown. It may be several years before impacts from this expansion will be felt at RFETS. Two of the new activities have already occurred and resulted in positive environmental impacts. These activities include the Division of Wildlife acquisition of Site property and the City of Boulder open space purchase which have created wildlife habitat and improved visual aesthetics through the prohibition of commercial and industrial development.

Traffic impacts from some of the projects above, such as continued residential development, will continue indefinitely. Many, however, will be short-term in nature, with staggered start and completion dates. Although it is possible for up to four of the projects to overlap, the effects will occur only through CY 2000, at which time the Highway 93 construction will be complete.

Table 3-13.
Cumulative Impacts to Resource Areas

Resource Areas Affected	Off-Site Contributing Activities	Impacts
Accidents	<ul style="list-style-type: none"> • Ralston Asphalt Co. • BFI Landfill • Highway 93 Construction • Jefferson County Athletic Facility construction • Proposed C-470 Expansion 	No change in radiological impacts of Site accidents.
Air	<ul style="list-style-type: none"> • Ralston Asphalt Co. • BFI Landfill • Highway 93 Construction • Jefferson County Athletic Facility construction • Proposed C-470 Expansion 	Off-site activities will collectively cause impacts to air quality in conjunction with RFETS commercial and commuter traffic.
Ecological Resources	<ul style="list-style-type: none"> • Division of Wildlife Acquisition of Site Property • Open Space Purchase 	These actions will preserve land currently available wildlife and will prevent fragmentation of habitat.
Health and Safety	<ul style="list-style-type: none"> • Ralston Asphalt Co. • BFI Landfill • Highway 93 Construction • Jefferson County Athletic Facility construction • Proposed C-470 Expansion 	No significant change.
Traffic and Transportation	<ul style="list-style-type: none"> • Ralston Asphalt Co. • BFI Landfill • Highway 93 Construction • Jefferson County Athletic Facility construction • Proposed C-470 Expansion 	Increased traffic levels will lead to higher incidence of traffic accidents. Off-site activities will intensify the impacts related to RFETS commercial and commuter traffic. This includes waste shipments leaving the Site, as well as materials coming onto the Site from other vendors.

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4.0 RESULTS AND CONCLUSIONS

4.1 Results

Impact changes resulting from a comparison between activities analyzed in the CID and those incorporated in the RFETS 2006 Plan are summarized in Table 4-1. Note that exclusion of a resource area from Table 4-1 denotes no change in impact. In reviewing the results, it is also important to note that, for some resource areas, the methods, assumptions, and activities analyzed in the CID did not always include sufficient detail to allow conclusive quantitative comparisons between the CID and the impacts from the changed activities analyzed in this Update. This is addressed in more detail in the relevant resource area discussions in Section 3.0.

Several impacts were identified in the course of the Update analysis which differ in nature or magnitude from those presented in the CID. A discussion of these noteworthy impact changes is provided below.

- Increased fugitive dust emissions from pavement removal. The conservative Update analysis indicates that a potentially substantial increase in TSP and PM₁₀ emissions could result from pavement removal. Impacts from these emissions will be temporary and will be amenable to mitigative dust control techniques (e.g., water spray). Since this activity was not addressed in the CID, direct comparisons of impacts of pavement removal activities as analyzed in the CID versus those of current plans cannot be made.
- Additional fugitive dust and noise impacts from concrete crushing. These impacts are associated with the RFETS initiative (not analyzed in the CID) to use recycled concrete from building D&D as clean fill instead of materials procured from off-site sources; these activities are described in the Concrete Recycling RSOP (DOE, 1999b). Estimated impacts from concrete crushing and storage are small in comparison to overall Site fugitive dust generation rates and are offset, to some degree, by concomitant reductions in impacts from fill material transportation and delivery.
- Decrease in vehicle-related risks from on-site TRU/TRM waste transportation. Essentially an "analytical effect," these risk reductions result primarily from use of an assumed 1-mile average trip distance in the Update versus an 8-mile average in the CID. Actual impacts of activities addressed in the Update are expected to be greater (by a factor of two or more) than those addressed in the CID because of increased waste relocations associated with additional on-site interim TRU/TRM waste storage. Risks remain insignificant under either analytical assumption.
- Increase in risk associated with development and maintenance of additional interim on-site storage of wastes (especially TRU/TRM). Although not directly comparable to activities analyzed in the CID, it is anticipated that additional interim storage (e.g., in Building 906) will be required on-site to temporarily store wastes which cannot be shipped immediately to waste disposal sites. Operation of these waste facilities is

expected to slightly increase the overall risks of closure because of the doses associated with waste placement and inspection and facility maintenance; associated risks will remain until the wastes can be shipped off-site.

- Lowered impacts from LLW/LLMW shipping. Impacts are predicted to be lower than those presented in the CID because the overall waste volumes (based on current waste generation estimates) are lower. Impacts from LLW/LLMW packaging were not explicitly addressed in the CID; however, risks to worker health from these activities were estimated in this Update, and remain well below the Site administrative limit of 750 mrem on an annual basis.
- Reduced overall impacts from closure cap material shipments. Based on current waste generation estimates and cap designs, total transportation trips (to and from RFETS) for waste shipment and closure material delivery are expected to be less than those evaluated in the CID. Under accelerated closure as set forth in the 2006 Plan, however, traffic impacts will be concentrated in the remaining years of closure (especially 2003-2005). Thus, accelerated closure may result in annual traffic volumes (and impacts) greater than those presented in the CID. Specific resource areas affected would include traffic volume, air emissions, and traffic-related accidents.
- Cumulative impacts. Since no significant impact changes are predicted as a result of 2006 Plan implementation, RFETS activities are expected to contribute to cumulative impacts in the same fashion as reported in the CID. However, a number of new activities whose impacts may be cumulative with those of Site closure were identified in the Update analysis. In general, more intensive development is occurring around and near RFETS; these activities will contribute a larger proportion of the cumulative impacts on traffic and vehicle emissions from activities in the RFETS vicinity.

Some of the activities and impacts identified in the Update analysis were not analyzed in the CID. In some cases (e.g., pavement removal) these represent entirely new activities; in others (e.g., LLW/LLMW packaging), the Update addresses a more complete spectrum of closure plan requirements. Accordingly, the Update reflects the full spectrum of the 2006 Plan and provides an updated technical resource for closure activity impacts.

Overall, no significant additional impacts were identified as a result of changes in closure activities analyzed in the CID and those anticipated under the 2006 Plan. Overall impacts from Site closure are not expected to be substantially greater than (and in some cases are estimated to be less than) those presented in the CID. Because many closure activities (e.g., D&D, waste shipment, cap material delivery) will be compressed into a shorter time frame than that anticipated at the time of the CID analysis, impacts per unit time will be larger in the years of greatest closure activity. Thus, under the 2006 Plan, annual impacts in the years 2003 through 2005 may be greater than those presented for a typical year in the CID.

4.2 Conclusions

As discussed in Section 4.1, no significant additional impacts or cumulative impacts beyond those addressed in the CID were identified in the Update analysis; this analysis considered impacts of activities in the 2006 Plan which differ from those analyzed in the CID. Accordingly, the original conclusions established using the CID regarding a RFETS Site Wide Environmental Impact Statement (SWEIS) remain valid. Specifically, "...environmental impacts of cleanup activities will be localized in the Industrial Area and will not present appreciable changes in Site-wide environmental impacts from those associated with Site operations reviewed under the 1980 SWEIS."

With regard to the need for a Supplement Analysis, the important conclusion flowing from the Update is to "...document whether the environmental impacts of current and planned future activities at the Site are adequately addressed in the CID." Given that no significant new or changed impacts were identified, it is concluded that the changed activities do not present appreciable changes in cumulative impacts from those analyzed in the CID. Results of the CID Update analysis also support DOE's conclusion about the need for a new SWEIS, based on the CID's adequacy.

Table 4-1
List of Changed Activities and Impacts

Revised Activity	Revision Impacts
<p>Changes in Annual LLW/LLMW and Sanitary Waste Shipments</p> <p>2006 Plan total shipments: LLW/LLMW—19,906 trips Sanitary—5,022 trips</p> <p>LLW/LLMW shipments: condensed shorter closure time frame</p>	<p>Air – Minor increase in vehicle criteria pollutant emissions.</p> <p>Traffic – Overall closure program decrease in on-site and off-site traffic volume and congestion.</p> <p>Transportation – On-site annual risk increases and decreases that vary by year, with an overall decrease in total closure risk. No change to risks from on-site accidents. Off-site routine risks showed annual and total closure program decreases for vehicle-related risks, decreased public and worker overall collective doses, and increases and decreases in MEI doses that vary by destination. Total program decrease in off-site vehicle-related accident risks. Both increases and decreases in risks from cargo-related accidents, varying by destination. No change to relative impacts from rail transport compared to truck transport.</p> <p>Human Health & Safety – Revised total worker dose for packaging of 360 mrem not directly comparable to any estimate in the CID. Public doses show annual increases and decreases that vary by year, with an overall decrease in total closure risks.</p> <p>Noise – Minor increase in road noise.</p>
<p>Cap Changes</p> <p>Cap Materials Shipments Condensed to Two-Year Period. 300/700 areas will not be capped.</p>	<p>Soils and Geology – Beneficial impact; an additional 13 acres will be restored. Also less potential for siltation due to reduced volumes of soil being moved, stored, and distributed.</p> <p>Water – Decrease in surface water runoff; increase in groundwater infiltration and flow.</p> <p>Air – Fugitive dust will be generated more quickly; less area will be</p>

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Revised Activity	Revision Impacts
	<p>capped; net effect is a slight decrease in TSP.</p> <p>Traffic – Increase in traffic volume, on- and off-site, during two-year shipping period only; decrease in all other years.</p> <p>Transportation – Annual vehicle-related risks 2.5 times higher for the two years of shipment, and absent in other years. Total program risk decreased by 50%.</p> <p>Human Health & Safety – Addressed in transportation impact analysis.</p> <p>Ecological Resources – Beneficial impact; Additional 13 acres will be restored, providing additional habitat for wildlife.</p>
<p>Pu Vault Construction Cancelled</p> <p>Vault of ~100,000 ft² will not be constructed.</p>	<p>Soils & Geology – Minor soil disturbance will not occur; beneficial impact.</p> <p>Air – Minor soil disturbance will not occur; slight decrease in fugitive dust.</p> <p>Human Health & Safety – Public and worker risks from SNM eliminated after all SNM moved off-site in 2002.</p> <p>Noise – Minor decrease in projected construction noise.</p>
<p>TRU/TRM Storage</p> <p>Increased interim TRU/TRM storage</p>	<p>Transportation – Total program decrease in on-site vehicle-related risks and radiological risks to involved workers, mainly due to updated methodology. Increase in radiological risks to co-located workers. No change in negligible public risks.</p> <p>Utilities & Energy – Minimal impact on utilities and energy requirement for additional TRU storage facilities.</p> <p>Human Health & Safety – Total estimated program risks of 3.5 rem to involved worker, 18.9 mrem to co-located worker, and 0.00434 LCFs to public not directly comparable to any risks in CID. However, an overall increase is expected, since on-site storage volume and duration has increased.</p> <p>Cultural Resources – Two of proposed buildings eligible for NRHP but have been documented in HAER and therefore impacts reduced to a non-adverse level; no change in impact.</p>
<p>Accelerated D&D of Buildings</p> <p>D&D of protected area buildings compressed into last 4 years of closure</p>	<p>Water – Possible changes in surface water and groundwater flows.</p> <p>Air – Temporary increase in fugitive dust (fugitive dust emissions from D&D activity were not addressed in the CID); fugitive dust will be generated more quickly. Possible increase in radiological air emissions</p> <p>Traffic – Short-term increases in on- and off-site traffic; overall decrease.</p> <p>Transportation – Waste volumes included in revised analysis of LLW/LLMW and sanitary waste transportation; see above.</p> <p>Human Health & Safety – No change in total program risks. Annual risks up to six times higher than previously predicted.</p> <p>Noise – Noise from demolition will increase on-site; workers will have mandatory hearing protection and will not be affected.</p>
<p>National Conversion Pilot Project</p>	<p>Soils and Geology – Additional 10 acres of land will be restored;</p>

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Revised Activity	Revision Impacts
<p>Cancelled</p> <p>Buildings 125, 130, 131, 444, 447, 460, 850, 865, and 883 will be demolished instead of preserved.</p>	<p>beneficial impact.</p> <p>Water – Minor change in hydrology associated with removal; decrease in surface water runoff.</p> <p>Air – Additional 10 acres of land will be restored; minor temporary increase in fugitive dust.</p> <p>Transportation – Waste volumes from additional D&D included in revised analysis of LLW/LLMW and sanitary waste transportation; see above.</p> <p>Human Health & Safety – Project operation doses decrease to zero. Increased total collective worker dose from additional building D&D of 42 person-rem</p> <p>Ecological Resources – Beneficial impact; an additional 10 acres will be restored, providing additional habitat for wildlife.</p> <p>Cultural Resources – Five buildings eligible for NRHP but have been successfully documented in HAER; impacts reduced to non-adverse level resulting in no change in impact.</p> <p>Noise – Noise from demolition will increase on-site; workers will have mandatory hearing protection and will not be affected.</p>
<p>Concrete Crushing and Reuse On-site.</p> <p>Concrete from demolition will be crushed on-site and used as fill.</p>	<p>Water – Possible degradation of surface water quality in runoff during crushing process.</p> <p>Air – Minor temporary increase in fugitive dust.</p> <p>Noise – Crushing operations will increase on-site noise; workers will have mandatory hearing protection and will not be affected.</p>
<p>Paving Removal.</p> <p>4.6 million ft² of paved roads, sidewalks, and parking lots will be removed.</p>	<p>Geology & Soils – Substantial beneficial impact; additional 105 acres of land restored.</p> <p>Water – Reduced surface water run-off and increased groundwater infiltration</p> <p>Air – Substantial but temporary increase in fugitive dust.</p> <p>Ecological Resources – Substantial beneficial impact; additional 105 acres of land restored, providing additional habitat for wildlife.</p> <p>Noise – Increased on-site noise; workers will have mandatory hearing protection and will not be affected.</p>
<p>New Off-site Actual or Planned Activities Cumulative Impacts.</p> <p>New activities include:</p> <ul style="list-style-type: none"> ▪ Northwest beltway (C-470) ▪ Fortune Reservoir constructed southeast of Site ▪ Expanding commercial & residential development to east and northeast of Site. 	<p>Air – Overall increase in vehicle emissions associated with increased development and traffic in the Denver metropolitan area.</p> <p>Traffic & Transportation – Continuing increases in off-site traffic volume and congestion due primarily to non-RFETS activities.</p> <p>Socioeconomics – Denver area economy expansion greater than that at the time of the CID analysis; may provide employment opportunities for former RFETS employees. Positive impact.</p>

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Revised Activity	Revision Impacts
<ul style="list-style-type: none"> ▪ Ralston Asphalt Company and Quarry ▪ BFI Landfill ▪ Highway 93 improvements and construction ▪ Portion of Site turned over to Division of Wildlife as wildlife habitat <p>Open Space purchased by City of Boulder west of Site</p>	
<p>Overall Acceleration of Site Closure Site closure to be accomplished by 2006 instead of 2010 or later as analyzed in CID.</p>	<p>Socioeconomics – Will lead to decreased number of employees and services needed in shorter time period than previously examined.</p> <p>Accidents – Total program risks decrease due to earlier removal of SNM</p>

Exclusion of a resource area denotes no change in impact.

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APPENDIX A:
TRANSPORTATION IMPACT ASSESSMENT TABLES

Table A-1.
On-site Transportation Risks, Routine, Vehicle-Related

	Annual LCFs to Workers and Public							Total
	2000	2001	2002	2003	2004	2005	2006	
LLW	0.0006	0.0006	0.003	0.008	0.003	0.005	0	0.02
LLMW	0.0003	0.0001	0.0003	0.001	0.0009	0.002	0	0.005
Sanitary	0.0004	0.0005	0.0004	0.0004	0.001	0.004	0	0.006
TOTAL	0.001	0.001	0.004	0.01	0.005	0.01	0	0.03

Table A-2.
On-site Transportation Risks, Routine, Cargo-Related

	Annual Dose (rem)							Total
	2000	2001	2002	2003	2004	2005	2006	
Involved Worker	6.5	4.5	4.7	5.3	0.56	0.54	0	22
Co-Located Worker	0.0012	0.0008	0.0008	0.0009	0.00009	0.00008	0	0.0040
Public	Negligible							

Table A-3.
Off-site Transportation Risks, Routine, Vehicle-Related

	Annual LCFs to Workers and the Public							Total
	2000	2001	2002	2003	2004	2005	2006	
LLW								
Envirocare	0	0	0	0	0	0	0	0
NTS	0.00091	0.00091	0.0045	0.011	0.0039	0.0073	0	0.029
LLMW								
Envirocare	0.00065	0.00027	0.00066	0.0029	0.0021	0.0050	0	0.012
NTS	0	0	0	0	0	0	0	0
Sanitary	0.00027	0.00028	0.00023	0.00023	0.00072	0.0023	0	0.0040
TOTAL	0.0018	0.0015	0.0054	0.015	0.0068	0.015	0	0.045

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Table A-4.
Off-site Transportation Risks, Routine, Cargo-Related

	2000	2001	2002	2003	2004	2005	2006	Total
Collective Worker Dose (person-rem)								
LLW								
ER- Envirocare	0	0	0	0	0	0	0	0
Ops-Envirocare	0	0	0	0	0	0	0	0
ER-NTS	0.14	0.20	2.3	6.4	2.3	4.3	0	16
Ops-NTS	24	20	21	20	2.3	1.9	0	89
LLMW								
ER- Envirocare	0.00086	0.00098	0.11	0.68	0.59	1.4	0	2.8
Ops-Envirocare	11	4.4	4.5	7.3	0.45	0.44	0	28
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0
TOTAL	34	25	28	35	5.6	8.0	0	135
MEI Worker Dose (rem)								
LLW								
ER- Envirocare	0	0	0	0	0	0	0	0
Ops-Envirocare	0	0	0	0	0	0	0	0
ER-NTS	0.069	0.10	1.2	3.2	1.1	2.2	0	7.8
Ops-NTS	12	10	10	10	1.2	0.93	0	45
LLMW								
ER- Envirocare	0.00044	0.00050	0.056	0.35	0.30	0.72	0	1.4
Ops-Envirocare	5.6	2.3	2.4	3.9	0.24	0.23	0	15
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0
Collective Public Dose (person-rem)								
LLW								
ER- Envirocare	0	0	0	0	0	0	0	0
Ops-Envirocare	0	0	0	0	0	0	0	0
ER-NTS	0.93	1.4	16	44	15	29	0	110
Ops-NTS	50	43	44	43	4.9	3.9	0	190
LLMW								
ER- Envirocare	0.0057	0.0065	0.72	4.5	3.9	9.3	0	18
Ops-Envirocare	23	9.6	9.9	16	0.98	0.96	0	60
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0
TOTAL	74	54	71	110	25	43	0	370

Table A-4, continued

	2000	2001	2002	2003	2004	2005	2006	Total
MEI Public Dose (rem)								
LLW								
ER- Envirocare	0	0	0	0	0	0	0	0
Ops-Envirocare	0	0	0	0	0	0	0	0
ER-NTS	0.0000017	0.0000025	0.000028	0.000080	0.000028	0.000053	0	0.00019
Ops-NTS	0.00046	0.00039	0.00040	0.00038	0.000044	0.000036	0	0.0017
LLMW								
ER- Envirocare	0.0000013	0.0000015	0.00016	0.0010	0.00089	0.0021	0	0.0042
Ops-Envirocare	0.00024	0.000099	0.00010	0.00016	0.000010	0.0000099	0	0.00062
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0

Table A-5.
Off-site Transportation Risks, Accident, Vehicle-Related

	Annual Fatalities to Workers and the Public							Total
	2000	2001	2002	2003	2004	2005	2006	
LLW								
Envirocare	0	0	0	0	0	0	0	0
NTS	0.040	0.040	0.20	0.51	0.17	0.32	0	1.3
LLMW								
Envirocare	0.015	0.0062	0.015	0.065	0.048	0.11	0	0.26
NTS	0	0	0	0	0	0	0	0
Sanitary	0.00017	0.00019	0.00015	0.00015	0.00047	0.0015	0	0.0026
TOTAL	0.055	0.047	0.21	0.57	0.22	0.44	0	1.5

Table A-6.
Off-site Transportation Risks to Members of the Public, Accident, Cargo-Related

	2000	2001	2002	2003	2004	2005	2006	Total
LLW Radiological Risk (LCFs)								
ER- Envirocare	0	0	0	0	0	0	0	0
Ops-Envirocare	0	0	0	0	0	0	0	0
ER-NTS	0.0019	0.0028	0.032	0.090	0.032	0.060	0	0.22
Ops-NTS	0.0055	0.0046	0.0048	0.0046	0.00053	0.00043	0	0.021
LLMW Radiological Risk (LCFs)								
ER- Envirocare	0.000017	0.000020	0.0022	0.014	0.012	0.028	0	0.056
Ops-Envirocare	0.0038	0.0016	0.0016	0.0026	0.00016	0.00016	0	0.0098
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0
LLMW Chemical Cancer Risk								
ER- Envirocare	1.3×10^{-12}	1.4×10^{-12}	1.6×10^{-10}	1.0×10^{-9}	8.7×10^{-10}	2.1×10^{-9}	0	4.1×10^{-9}
Ops-Envirocare	4.4×10^{-10}	1.8×10^{-10}	1.9×10^{-10}	3.16×10^{-10}	1.9×10^{-11}	1.8×10^{-11}	0	1.2×10^{-9}
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0
LLMW Noncancer Hazard Quotient								
ER- Envirocare	2.3×10^{-9}	2.6×10^{-9}	2.9×10^{-7}	1.8×10^{-6}	1.6×10^{-6}	3.7×10^{-6}	0	7.5×10^{-6}
Ops-Envirocare	4.9×10^{-7}	2.0×10^{-7}	2.1×10^{-7}	3.4×10^{-7}	2.1×10^{-8}	2.0×10^{-8}	0	1.3×10^{-6}
ER-NTS	0	0	0	0	0	0	0	0
Ops-NTS	0	0	0	0	0	0	0	0

Table A-7.
Off-site Rail Transportation Risks

Mode	Cumulative Dose (person-rem)		MEI Dose (rem)	
	Worker	Public	Worker	Public
Per Shipment Basis				
Truck	0.000819	0.00541	0.000410	0.0000000130
Train	0.00500	0.000562	0.00100	0.0000000119
Equal Volume Basis (4 Trucks:2 Rail Cars)				
Truck	0.00328	0.0217	0.00164	0.0000000520
Train	0.00500	0.000562	0.00100	0.0000000119

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Table A-8.
Annual Vehicle-Related LCFs to Workers and Members of the Public
from Cap Materials Shipments

2000	2001	2002	2003	2004	2005	2006	Total
0	0	0	0	0.05	0.05	0	0.1

Table A-9.
Annual Vehicle-Related Risks from On-site Transportation of TRU/TRM Waste

	2000	2001	2002	2003	2004	2005	2006	Total
Worker (LCFs)	4.3×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	0.0003
Public	Insignificant							

Table A-10.
Annual Cargo-Related Risks from On-site Transportation of TRU/TRM Waste

	2000	2001	2002	2003	2004	2005	2006	Total
Involved Worker (LCFs)	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0161
Co-Located Worker MEI (mrem)	0.49	0.49	0.49	0.49	0.49	0.49	0.49	3.43
Public	Insignificant							

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